An Overview of the Subsistence Fisheries of the Bristol Bay Management Area

by

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Executive Summary

◊ Bristol Bay subsistence fisheries are an essential component to the local economy and way of life of Bristol Bay communities. About half of the subsistence harvest by local community residents, as measured in pounds usable weight, is salmon and about 10 percent is other fish.

◊ The Alaska Board of Fisheries has found that all finfish of the Bristol Bay Area are customarily taken or used for subsistence purposes. As established by the Board, the amounts necessary for subsistence uses include 157,000 to 172,171 salmon (including 55,000 to 65,000 Kvichak River drainage sockeye salmon) and 250,000 pounds usable weight of other finfish.

◊ The number of Bristol Bay subsistence salmon permits issued has been very stable since 1990. The recent (1996 – 2005) 10-year average is 1,163 permits.

◊ Most subsistence permit holders are residents of Bristol Bay communities; for the 10-year period 1996 – 2005, 84% of permit holders were Bristol Bay residents.

◊ Most subsistence permits are issued for the Nushagak and Naknek/Kvichak districts.

◊ Sockeye salmon make up the largest portion of the Bristol Bay subsistence salmon harvest – 77% percent of the recent 10-year average, followed by Chinook (12%), coho (6%), chum (4%), and pink (1%).

◊ Annual subsistence salmon harvests in the Bristol Bay Area declined from the early 1990s to the early 2000s. Since 1975, the average annual harvest was about 157,000 salmon; the recent 5-year average was 123,000 salmon. Estimated harvests in 2000 (119,000 salmon), 2001 (120,000 salmon), and 2002 (110,000 salmon) are among the lowest on record; estimated harvests were about 132,000 salmon in 2003; 127,000 salmon in 2004; and 129,000 salmon in 2005.

◊ The largest decline over the last 10 to 15 years has occurred in the Kvichak watershed subsistence sockeye salmon fishery, historically the largest component of the Bristol Bay subsistence salmon harvest. The long-term (43-year) average annual harvest for this fishery is about 67,000 sockeye salmon. The recent 5-year average annual harvest is about 41,000 salmon. Harvests in 2000 (36,990 sockeye salmon), 2001 (32,808), and 2002 (33,001) were the lowest on record. Declines are due to lower harvests per permit rather than less participation in the fishery, and are attributed by local fishers to reduced abundance of fish in traditional harvest areas. Since 1996, catch per day is down 26% in years of escapements under 2 million fish compared to the previous 13-year average.

◊ Other fish taken for subsistence purposes in the Bristol Bay Area include herring, smelt, Dolly Varden, lake trout, rainbow trout, Arctic grayling, northern pike, whitefish, burbot, and blackfish. There are no ADF&G annual subsistence harvest assessment programs for these stocks, but harvest estimates are available through periodic household surveys. These fish

are taken throughout the year using a variety of harvest methods and are an important part of annual subsistence uses in the Bristol Bay Area.

TABLE OF CONTENTS

List of Tables..... ii
List of Figures..... ii

Introduction..... 1

The Bristol Bay Region 1
Population, Communities, and Cash Economy..... 1
General Patterns of Subsistence Uses..... 2

The Subsistence Salmon Fishery..... 3
Regulations 3
The Subsistence Permit System..... 4
Participation..... 5
Subsistence Salmon Harvests 6

Sockeye Salmon Subsistence Fishery of the Kvichak District..... 8

Other Subsistence Fisheries..... 10
Subsistence Regulations 10
Subsistence Harvests and Uses..... 11

Conclusions..... 13

References Cited..... 15

Tables and Figures..... 17

LIST OF TABLES

Table 1. Population of the Bristol Bay Management Area, 1980, 1990, 2000, and 2005...19
Table 2. Number of Subsistence Permits Issued, Estimated Subsistence Salmon Harvests by Species, and Average Subsistence Salmon Harvest per Permit, Bristol Bay Management Area, 1975 - 2005.....20
Table 3. Ten-Year Average (1996 – 2005) Subsistence Salmon Harvests by District, Bristol Bay Area.....21
Table 4. Number of Subsistence Permits Issued, Kvichak Watershed, 1983 – 2005.....22
Table 5. Subsistence Harvest of Sockeye Salmon by Community in Numbers of Fish, Kvichak River Drainage, Bristol Bay, 1963 – 2005.....23
Table 6. Uses and Harvests of Fish Other Than Salmon, Bristol Bay Communities.....24
Table 7. Nonsalmon Fish Known to be Used for Subsistence Purposes in the Bristol Bay Area.....25

Appendix Table 1. Bristol Bay Subsistence Salmon Harvests by District and Species, 1985 - 2005.....36
Appendix Table 2. Subsistence Salmon Harvests by Species, in Numbers of Fish, by District and Location Fished, Bristol Bay, 2005.....38
Appendix Table 3. Subsistence Salmon Harvest by Community, Nushagak District, Bristol Bay, 1985 – 2005.....39
Appendix Table 4. Subsistence Harvest of Sockeye Salmon by Community, in Numbers of Fish, Kvichak River Drainage, Bristol Bay, 1985 – 2005.....40

LIST OF FIGURES

Figure 1. The Bristol Bay Region.....26
Figure 2. Composition of Bristol Bay Subsistence Harvests, 1980s/1990s.....27
Figure 3. Number of Bristol Bay Subsistence Permits Issued, 1975 - 2005.....27
Figure 4. Percentage of Bristol Bay Subsistence Salmon Permits Issued by Area of Residence of Permit Holder, 1993 - 2005.....28
Figure 5. Estimated Subsistence Salmon Harvests, Bristol Bay Management Area, 1975 - 2005.....28
Figure 6. Average Salmon Harvest per Subsistence Permit, Bristol Bay Management Area, 1975 - 2005.....29
Figure 7. Composition of Bristol Bay Subsistence Salmon Harvest by Species, 1993 - 2005.....29
Figure 8. Bristol Bay Subsistence Salmon Harvest by District, 1993 - 2005.....30
Figure 9. Percentage of Bristol Bay Subsistence Salmon Harvest by Area of Residence, 1993 - 2005.....30
Figure 10. Average Subsistence Salmon Harvest per Permit, 10-Year Average, 1996 - 2005, Bristol Bay Area, by District.....31
Figure 11. Number of Subsistence Permits Issued, Kvichak Watershed, Bristol Bay Area, 1983 – 2005.....31
Figure 12. Estimated Subsistence Harvests of Sockeye Salmon, Kvichak Watershed, 1963 – 2005.....32

Figure 13. Average Subsistence Sockeye Salmon Harvest per Permit, Kvichak Watershed, 1983 – 2005.....32
Figure 14. Average Subsistence Sockeye Salmon Harvest per Permit, Local Community Residents, Kvichak Watershed, 1983 – 2005.....33
Figure 19. Kvichak Watershed Subsistence Fishery: Harvest of Sockeye Salmon per Day Fished, 1983 – 2005.....33
Figure 20. Escapement of Sockeye Salmon into the Kvichak Watershed Compared to Average Subsistence Harvest per Day Fished, 1983 – 2005.....35

INTRODUCTION

In an area that is world-renowned for its commercial fisheries and its recreational opportunities, subsistence use of wild, renewable resources remains the most consistent and the most reliable component of the local economy of Bristol Bay communities. Subsistence fishing, hunting, and gathering provide hundreds of pounds of highly nutritious food for the area's people. Much of the seasonal round of activities is shaped by the natural cycles of fish, birds, mammals, and plants. Knowledge that is fundamental to making a living in the region is preserved and passed on through fishing, hunting, gathering, and processing wild resources. Values that support families and communities are expressed, emphasized, and taught while people harvest, prepare, and share wild foods. Over the course of the 20th century, much economic, social, cultural, and demographic change took place in Bristol Bay as a mixed economy with cash and subsistence sectors evolved. At the beginning of the 21st century, the link to the traditions of the past, a cornerstone of the way of life today, and one of the bases for the survival and prosperity of the communities of Bristol Bay in the future remains the activities, the knowledge, and the values that are called "subsistence."

This report will very briefly describe the subsistence fisheries of the Bristol Bay Management Area, with a primary focus on the salmon fisheries. It is based on information gathered through the department's subsistence salmon permit system and from research conducted by the Division of Subsistence. Figure 1 depicts the Bristol Bay region and its communities.

THE BRISTOL BAY REGION

Population, Communities, and Cash Economy

At the time of the last federal census in 2000, the population of the Bristol Bay area was 7,520 in 26 communities (Table 1). In 1990, the US Census estimated the area's population at 6,573; thus there was an increase of 14% during the 1990s. Estimates by the Alaska Department of Labor and Workforce Development place the 2005 population of the area at 7,061, a decline of 6%. There are two regional centers: Dillingham (population 2,370 in 2005) and the Bristol

Bay Borough (consisting of Naknek, South Naknek, and King Salmon) (population 1,073 in 2005). In 2000 in the region overall, 72% of the population was Alaska Native. In the 22 communities other than the regional centers, 87% of the population was Alaska Native. The Native peoples of the area include Central Yup'ik, Dena'ina Athabascan, and Alutiiq.

Commercial fishing and services dominate the cash economy of the area. It is highly seasonal. The 1990 US Census estimated a per capita income for the area of $13,154, below the state average of $17,610. Cash incomes in the smaller communities resemble those of other remote, predominately Alaska Native villages throughout the state, with a per capita income of $8,135 in 1989 (US Department of Commerce 1992). Studies by the Division of Subsistence have also documented this pattern of seasonal employment, reliance on commercial fishing, and relatively low cash incomes (ADF&G 2006; Scott et al. 2001).

General Patterns of Subsistence Uses

Subsistence harvests in the Bristol Bay area are among the largest in the state, and very diverse. Based on the results of systematic household surveys conducted by the Division of Subsistence, the estimated annual area-wide harvest of wild foods in the 1980s and 1990s was 422 pounds usable weight per capita and 1,439 pounds per household. As shown in Figure 2, salmon made up 51% of this harvest, land mammals (mostly moose and caribou) were 31% percent, fish other than salmon (see below) comprised 10%, and other resources, such as marine mammals, birds and eggs, marine invertebrates, and wild plants provided the remaining 8%.

Wild resource harvests are generally higher in the smaller communities of the Bristol Bay Area than in the 2 regional centers. The area-wide estimate for these smaller communities for the 1980s/1990s period was 587 pounds per person per year, with a household average of 2,284 pounds. For this period, the composition of subsistence harvests in the smaller communities was very similar to that of the area overall: 49% salmon, 31% land mammals, 11% other fish, and 9% other.

The importance of subsistence harvests to the economy of the Bristol Bay region is evident when considering the potential cost of purchasing replacements for the foods produced by local hunting, fishing, and gathering. At a replacement cost of $5/pound, the annual value of the average household subsistence harvest in the region is $7,195; for village households it is

$11,420. Using the $5/pound figure, it would cost the average Bristol Bay household 16% of its cash income to purchase replacements for lost subsistence harvests; the average village household would spend 36% of its cash income to buy replacement food. Of course, this exercise ignores the cultural, social, and nutritional costs of replacing subsistence foods with imported substitutes. Indeed, it is unlikely that adequate substitutes can be purchased for most of the subsistence foods that are produced in the region.

THE SUBSISTENCE SALMON FISHERY

Regulations

The Board of Fisheries has found that salmon of the Bristol Bay Area support customary and traditional (subsistence) uses (5 AAC 01.336). In 1993, the Board established a range of 157,000 - 172,171 salmon as the amount necessary to provide a reasonable opportunity for this subsistence use. The low point of this range was the lowest subsistence harvest in the area over the previous 11 years (1982-1992), while the high point was the average harvest over that same period. In 2001, the finding was amended to specify that of the total, 55,000 to 65,000 Kvichak River drainage sockeye salmon (excluding Alagnak River stocks) are necessary to provide a reasonable opportunity for subsistence uses.

The following is a synopsis of the key provisions of the subsistence salmon fishing regulations for the Bristol Bay area.

- ◊ Permits. Required. Limit of one per household. Must be returned with a record of harvest.
- ◊ Seasonal limits: None established in regulation. The Department may set limits on the permit for conservation purposes. An exception is that there is an annual possession limit of 200 sockeye salmon taken after August 15 in the Naknek District.
- ◊ Gear: Drift and set gillnets in areas open to commercial fishing. Set gillnets only in other areas, except spears may be used in the Togiak River. Nets may be up to 25 fathoms in length except in the Naknek, Egegik, and Ugashik Rivers, in the Dillingham beach areas, and during emergency openings in the Nushagak District, where they may be no more than 10 fathoms in length. Also, in 1998, the Board of Fisheries adopted new regulations for the

taking of "redfish" (spawned sockeye salmon) in portions of the Naknek District. Gillnets, spears, and dipnets may be used along a 100 yard length of the west shore of Naknek Lake near the outlet to the Naknek River from August 20 through September 30; at Johnny's Lake from August 15 through September 25; and at the mouth of the Brooks River from October 1 through November 15.

◊ Seasons. Except as follows, fishing is open at any time.

◊In areas open to commercial fishing, from May 1 - 31 and October 1 - 31, from 9 a.m. Monday to 9 a.m. Friday; from June 1 - September 30, during open commercial fishing periods.

◊In the area of the Nushagak District generally called "the Dillingham beaches," from July 2 - July 17, three 24-hour periods per week (from 9 a.m. Monday to 9 a.m. Tuesday, 9 a.m. Wednesday to 9 a.m. Thursday, and 9 a.m. Friday to 9 a.m. Saturday). This area is defined as: all waters upstream of a line between an ADF&G regulatory marker located two statute miles south of Bradford Point and an ADF&G regulatory marker located on Nushagak Point to an ADF&G regulatory marker located at Red Bluff on the west shore of the Wood River, and to an ADF&G regulatory marker located at Lewis Point on the north shore on the Nushagak River.

◊In the Naknek, Egegik, and Ugashik rivers, from June 23 to July 17, two 24-hour periods a week (from 9 a.m. Tuesday to 9 a.m. Wednesday and 9 a.m. Saturday to 9 a.m. Sunday). (In 2001, 2002, and 2003, ADF&G by emergency orders opened extra subsistence fishing periods in the Egegik District during commercial fishing closures.)

The Subsistence Permit System

As noted above, subsistence salmon fishers in the Bristol Bay Area are required to obtain an annual subsistence permit from ADF&G. These permits are issued free-of-charge, but are only issued to Alaska residents (minimum of one year's residency in the state). The permit includes a harvest calendar for recording daily harvests by species. These permits are available at department offices in Dillingham and King Salmon, and from vendors in most area

communities. The Division of Subsistence has the primary responsibility for administering the Bristol Bay subsistence permit system.

Since 1963, subsistence salmon harvest data based on permit returns have been reported in the Bristol Bay Annual Management Report ("AMR"), prepared by the Division of Commercial Fisheries. Since 1983, the Division of Subsistence has entered all permit data into a computerized database. To ensure a high level of return, division staff send 2 reminder letters to permit holders and make village visits and phone calls as time and funding permit. Radio announcements in English and Central Yup'ik are also broadcast. These measures have been very successful, with overall permit returns averaging better than 85% annually. Most subsistence fishing households in the Bristol Bay Area obtain and return their salmon permits and harvest calendars.

Participation

Figure 3 illustrates the number of subsistence permits issued for the Bristol Bay Area from 1975 through 2005 (see also Table 2, Appendix Table 1). For this 31-year period, the average number of Bristol Bay subsistence permits issued was 1,035. The recent 10-year average for the period 1996 - 2005 was 1,163 permits and the most recent 5-year average was 1,135 (Table 2). Most of the increase in permits issued in 1990 and 1991 was due to the reopening of the area's subsistence salmon fisheries to non-local Alaska residents. Since the early 1990s, the number of subsistence permits issued annually for Bristol Bay has been very stable. Appendix Tables 2 through 4 report participation and harvest levels for each district and subdivisions of districts for 2005.

The vast majority of participants in the Bristol Bay subsistence salmon fishery are year-round residents of Bristol Bay communities. For the 10-year period from 1996 through 2005, 83.7% of the permits were issued to Bristol Bay residents, and 16.3% to other Alaska residents. This percentage has been fairly steady since 1992 (Fig. 4).

Subsistence Salmon Harvests

Figure 5 illustrates the estimated subsistence salmon harvests for the Bristol Bay Area for 1975 through 2005 (see also Table 2 and Appendix Table 1). The 31-year average harvest was 157,337 salmon; the most recent 10-year average was 131,329 salmon; and the most recent 5-year average is 123,357 salmon (Table 2). These data show that after about two decades of relative stability in the 1970s and 1980s, a downward trend in total subsistence salmon harvests in Bristol Bay occurred beginning in the early 1990s, although harvests in 2003, 2004, and 2005 rebounded from near-record lows in 2000, 2001, and 2002. The estimated total Bristol Bay subsistence salmon harvest in 2005 was 128,811 fish.

Average harvests per permit in the Bristol Bay Area subsistence salmon fishery declined over the 1975-2002 period and especially from the early 1990s to 2002 (Fig. 6, Table 2). Average harvests per permit have increased since 2002. For the 31-year period overall, the average harvest per permit was about 152 salmon; for the most recent 10-year period, this average was 113 salmon; and for the most recent 5-year period, the average was 109 salmon. The average harvest per permit in 2005 of 120 salmon was the highest since 1997 (Table 2).

During the 1975-2005 period, sockeye salmon made up about 79% percent of the total subsistence salmon harvest in the Bristol Bay Area (Fig. 7, Table 2). Chinook salmon ranked second at 9%, followed by coho (5%), chum (5%), and pink (2%). For the most recent 10-year period (1996-2005), the portion of Chinook salmon in the area's subsistence harvest increased to about 12%, with drops in the relative contribution of chum and pink salmon.

Figure 8 illustrates the recent 10-year (1996 through 2005) average percentage of the total Bristol Bay Area subsistence salmon harvest for each management district. The Naknek/Kvichak District has accounted for the largest portion of the subsistence harvest, at about 57% percent; the Nushagak District ranked second at 36%, followed by Togiak (3%), Egegik (2%), and Ugashik (1%).

Table 3 reports the most recent 10-year (1996 -2005) average subsistence salmon harvests for each of the 5 Bristol Bay districts. In descending order, these most recent average harvests were 74,611 salmon in the Naknek/Kvichak District, 47,288 salmon in the Nushagak District, 4,508 salmon in the Togiak District, 3,080 salmon in the Egegik District, and 1,829 salmon in the Ugashik District.

The large majority of the subsistence salmon harvest in the Bristol Bay Area is taken by residents of the area. For the most recent 10-year period (1996 through 2005), 92% of the total harvest was taken by local permit holders, and 8% by non-local Alaska residents (Fig. 9).

Within the Bristol Bay Area, average subsistence salmon harvests per permit differ by district. As illustrated in Figure 10 (see also Table 3), the largest annual average catch during the period 1996 – 2005 occurred in the Naknek/Kvichak District at 145 fish per permit, followed by the Nushagak District (90 salmon), the Togiak District (85 salmon), the Ugashik District (73 salmon), and the Egegik District (68 salmon).

KVICHAK DISTRICT SOCKEYE SALMON SUBSISTENCE FISHERY[1]

Historically, subsistence salmon harvests in the Kvichak River watershed, including Iliamna Lake and Lake Clark, have been the largest within the Bristol Bay Area. There are 8 year-round communities within the watershed: Igiugig (population 50 in 2005), Iliamna (86), Kokhanok (179), Levelock (54), Newhalen (180), Nondalton (203), Pedro Bay (62), and Port Alsworth (106). Virtually all of the subsistence salmon harvest in the watershed is sockeye salmon; other species are generally absent upstream of the confluence of the Alagnak (Branch) River with the Kvichak River.

The number of subsistence salmon permits issued for fishing in the Kvichak River watershed has been relatively stable since the early 1990s, when non-local residents were again allowed to obtain permits (Fig. 11). The recent 10-year average (1996 – 2005) was 200 permits. Note that the number of issued permits dropped in 2002 to 180, the lowest number issued since 1991 (Table 4). This reflects in part a prohibition by the National Park Service (NPS) against subsistence fishing in the waters of Lake Clark National Park and Preserve except by federally qualified local rural residents, begun in May 2001 (ADF&G 2001:71). But this NPS prohibition does not account for drops in subsistence harvests (see below), because most subsistence fishers in the Kvichak River watershed live in local communities; for the recent 10-year period (1996 – 2005), 83% of the subsistence permits were issued to local community residents.

[1] The Division of Subsistence prepared a detailed reporton the Kvichak River watershed subsistence salmon fishery for the Alaska Board of Fisheries in January 2001 (Fall et al. 2001). The section that follows updates harvest data for this component of the Bristol Bay subsistence salmon fishery.

Table 5 reports the estimated subsistence sockeye salmon harvests from the Kvichak River watershed for the period 1963 through 2005. The long-term, 43 year average harvest is 67,448 sockeye salmon. As shown in Figure 12, subsistence sockeye salmon harvests in this drainage declined markedly from the early 1990s to the early 2000s. The average annual harvest for the most recent 10-year period (1996 through 2005) was 46,857, compared to 68,908 for the previous 10-year period (1986 through 1995). The estimated total harvests for 2000 (36,990 sockeye), 2001 (32,808 sockeye), and 2002 (33,001 sockeye) were the lowest ever recorded for the fishery. These harvest levels are below the range of 55,000 to 65,000 sockeye salmon established by the Board of Fisheries in 2001 as necessary for providing a reasonable opportunity for subsistence uses (ANS) in the watershed. Estimated subsistence harvests in the drainage increased to 38,495 sockeye salmon in 2003; 53,225 in 2004; and 48,263 in 2005, but remained below the minimum value in the ANS range.

As illustrated in Figure 13, average sockeye salmon harvests per subsistence permit in the Kvichak watershed declined from the late 1980s to 2001. For all permit holders, the average harvest per permit was 174 sockeye salmon in 2000, 158 in 2001, and 183 in 2002, compared to a recent 20-year average of 303 sockeye salmon per permit. Since 2001, average subsistence harvests per permit have increased, to 258 sockeye salmon per permit in 2004 and 249 in 2005. Permit holders who live in Kvichak drainage communities show a similar pattern of declining subsistence harvests per permit from the early 1990s to 2001, when the lowest average harvest per permit (176 sockeye) was recorded (Fig. 14.) Average harvests per permit for local residents have since increased, to 285 sockeye per permit in 2004 and 270 per permit in 2005. These averages remain well below those recorded before 2000, however.

In 2000, Division of Subsistence researchers interviewed representatives of about 29 subsistence fishing households in Kvichak watershed communities about their subsistence salmon harvests (Fall et al. 2001). Although systematic interviewing did not occur in the subsequent years of record low harvests (2001 and 2002), less formal interaction between local fishers and division staff suggested that similar assessments pertained to those years as well. Generally, subsistence fishers reported that returns of sockeye salmon were late in 2000. Also, once the runs began, fish returned in "bunches" or "spurts" unlike the steadier runs of prior years. Consequently, fishers needed to keep their nets in the water longer to achieve their harvest goals. However, some fishers reported in 2000 that even with the increased effort, fishing was

so "slow" that they eventually stopped fishing before reaching their harvest goals. They intended to compensate for poor salmon harvests with more fishing over the winter for nonsalmon fish (although recent warm winters have inhibited these harvests as well), and more caribou and moose harvests (Fall et al. 2001:47). Interviews conducted in 2000 and in 2003 also found that subsistence fishing families in several Kvichak watershed communities (including Igiugig, Iliamna, Newhalen, and Pedro Bay) changed the location of their fishing efforts in an attempt reach their harvest goals (Fall et al. 2001:32,34,35,38; Krieg 2003).

Review of subsistence permit data for 1996, 1997, 2000, 2001, 2002, and 2003, years of unusually low sockeye escapements into the Kvichak watershed (less than 2 million salmon in each year), shows that subsistence harvests per day fished dropped by 28% compared to the previous 13-year average, from about 42.2 sockeye salmon per day from 1983 through 1995 to 31.3 per day for the years from 1996 to 1997 and 2000 through 2003 (Fig. 15, Fig.16). Note that in 1999, when the escapement topped 6 million sockeye salmon, the subsistence catch per day rebounded to about 40 sockeye salmon. These permit data are consistent with the reports from subsistence fishers concerning local scarcities of salmon and the difficulties they have faced in achieving desired harvest levels. It should also be noted that average catches per day in years of good salmon returns likely do not reflect the harvest potential of the subsistence fishery. Normally, subsistence harvests are self-limiting, largely depending upon each family's capability of processing the catch. Thus the catch per day averages prior to 1996 likely illustrate how many salmon the average family can process in a day rather than the maximum they could catch in a day. In contrast, the average of about 30 fish per day appears to reflect the harvest potential in recent years of returns under 2 million salmon.

OTHER SUBSISTENCE FISHERIES

Subsistence Regulations

The Alaska Board of Fisheries has determined that all finfish of the Bristol Bay Management Area support customary and traditional uses (5 AAC 01.336). The Board determined that approximately 250,000 pounds (usable weight; about 41 pounds per person) of fish other than salmon is the amount necessary to provide for these uses. This amount was based upon estimates of non-salmon fish harvests derived from systematic household surveys conducted by the Division of Subsistence (ADF&G 2006; Scott et al. 2001). The Board did not establish amounts necessary for specific species or more specific stocks of non-salmon fish.

For the most part, subsistence fishing for fish other than salmon and rainbow trout is open year-round in the Bristol Bay Area with gear listed in 5 AAC 01.010(a). There are no seasonal limits established by regulation. The Board repealed a subsistence permit requirement for trout and char in December 2003. The following regulations apply to subsistence fishing for fish other than salmon in the area.

- ◊ Rainbow trout taken incidentally in other subsistence net fisheries or through the ice are lawfully taken and may be retained for subsistence uses (5 AAC 01.310(g)).
- ◊ Subsistence fishing with a line attached to a rod or pole is prohibited except when fishing through the ice (5 AAC 01.320(l)).
- ◊ Subsistence fishing with nets is prohibited in 18 waters of the Kvichak/Iliamna Lake drainage and within one-fourth mile of the terminus of those waters from September 1 through June 14.

Subsistence Harvests and Uses

A detailed description of subsistence uses of freshwater fish in the Bristol Bay Area appears in Fall et al. (1996). Wright and Chythlook (1985) describe uses of herring spawn on kelp in the Togiak District. As noted above and shown in Figure 2, harvests of fish other than salmon contribute about 10% of the annual subsistence harvests of wild foods in the Bristol Bay

region, about 41 pounds (usable weight) per pers on. In the communities outside the regional centers (Dillingham and the Bristol Bay Borough), the per capita harvest is about 62 pounds per person.

Subsistence harvests of fish other than salmon are not annually monitored by the Department of Fish and Game. Harvest and use data are available for all communities through Division of Subsistence household harvest surveys (ADF&G 2006). Some of the findings of this research regarding non-salmon fish are summarized in Table 7. The vast majority of households in the Bristol Bay area use fish other than sa lmon for subsistence purposes. Most households also participate in the harvest of these fish. Harvests as measured in pounds usable weight per person for available study years vary from community to community, but are generally substantial. Harvests ranged from a low of 12 pounds per person (Port Alsworth in 1983) to 175 pounds per person (Nondalton in 1983). Harvests in 9 communities exceeded 50 pounds per person per year; these harvests exceeded 20 pounds per person per year in an additional 8 communities. Fish other than salmon generally rank third behind salmon and land mammals in their contribution to the total subsistence harvests in Bristol Bay communities.

Harvests and uses of non-salmon fish listed in Table 8 have been documented in Bristol Bay communities through Division of Subsistence research. Uses of other species may occur.

Harvest quantities of particular species vary between communities, subregions, and from year to year. Generally, fish taken in the larg est quantities in the area as a whole include smelt, whitefish, Dolly Varden, Arctic grayling, and north ern pike (see Fall et al. 1996 for more a more detailed discussion of harvest quantities by species by community).

In the Bristol Bay Area, harvests of non-salmon finfish occur throughout the year. Harvest effort for these fish is generally lo wer among Bristol Bay residents in the summer as attention is focused on salmon. Spring is im portant for herring, herring spawn-on-kelp, and smelt. Substantial harvests of non-salmon fish occur through the ice in winter. Smelting is a popular activity in October and in late winter when they can be caught by jigging through the ice (Wright et al. 1985:34)

Many gear types are used to harvest non-sa lmon fish for home use in the Bristol Bay Area. Rod and reel is used for most fish a nd some, such as Dolly Varden/Arctic char, herring, and other marine fish are removed from commerc ial catches. Various other methods are used, including (but not necessarily limited to) the following:

- ◊ Traps: blackfish, burbot
- ◊ Set hooks: burbot
- ◊ Handline jigging through the ice: grayling, Dolly Varden/Arctic char, lake trout, smelt, rainbow trout, whitefish, pike
- ◊ Set gill nets: grayling, Dolly Varden/Arctic char, lake trout, suckers, rainbow trout, herring, pike, burbot, whitefish
- ◊ Beach seining: Dolly Varden/Arctic char, lake trout, whitefish, smelt, herring
- ◊ Hand line in open water: halibut, rainbow trout
- ◊ Dip nets: smelt, herring

Herring spawn on kelp is usually pick ed by hand, although rakes, knives, and *uluaqs* (woman's knife) are also used (Schichnes and Chythlook 1988:127).

Maps of areas used by Bristol Bay communitie s to harvest non-salmon fish appear in the Alaska Habitat Management Guide Reference A tlas Series (ADF&G 1985), in Wright et al. (1985), and in Krieg et al. 2005 (for Kvichak drainage communities only). Harvest activities occur throughout the region in most rivers, lakes, and along shorelines. It is likely that most effort occurs near each community and near seas onal camps at such locations as Kulukak. (See Wright and Chythlook (1985) and Schichnes and Chythlook (1988) for maps of herring camps at Kulukak Bay. For frequency of use of various areas for freshwater fishing by Nushagak River communities, see Schichnes and Chythlook (1991).)

Bristol Bay residents use a wide variety of me thods to process and preserve their harvests of fish other than salmon. These vary by species and community. Some freezing of harvests of most species occurs. Some examples of other methods include the following:

- ◊ Grayling: dried, half-dried, fresh frozen, aged frozen and eaten with seal oil
- ◊ Dolly Varden: dried, smoked, half dried (*egamaarrluk*)
- ◊ Pike: dried, half-dried, fresh frozen, aged frozen and eaten with seal oil
- ◊ Rainbow trout: dried, half-dried, smoked
- ◊ Whitefish: dried, fresh frozen, aged frozen and eaten with seal oil,

Much dry fish is eaten with seal oil. Some use of brown bear fat with dry fish also occurs. Smelt are fried, boiled, dried, or eaten frozen with seal oil (Fall et al. 1986:100). Herring are salted, or split, dried, and smoked (Schichnes and Chythlook 1988:126). Pike heads and stomachs are boiled and eaten (Schichnes a nd Chythlook 1991:139). Fres hwater fish that are usually eaten frozen with seal oil also form a category known as *kanlunaq*. This includes grayling, whitefish, lake trout, and pike (Fall et al. 1986:102).

Much traditional knowledge is associated with nonsalmon fish. For example, a Yup'ik classification system for some types of freshwater fish exists that is different from that developed by Western science. Three kinds of fish separately named in Central Yup'ik all are classed by biologists as "Dolly Varden." Distinctions are made in Yup'ik depending upon the condition of the flesh for aging, drying, or freezing; harvest locations; and harvest methods (Fall et al. 1996).

CONCLUSIONS

This overview has illustrated the continued importance of subsistence fisheries to the economy and way of life of the Bristol Bay area of southwest Alaska. Harvests of salmon and other fish provide the largest portion of the substantial subsistence harvests of Bristol Bay communities. In addition to their nutritional and economic value, the subsistence fisheries of the region support cultural and social values that are a foundation of life for the people of Bristol Bay. Historically, subsistence harvests of salmon and other fish have been fairly stable and reliable, especially in comparison with the cash sector of the local economy. Subsistence salmon permit records demonstrate a decline in subsistence salmon harvests in the Bristol Bay Area during the 1990s. This decline occurred primarily in the Nushagak and Naknek/Kvichak districts, and is the result of lower average catches per permit rather than lower participation in the fishery by local community residents. Substitution of Chinook for sockeye salmon accounts for some, but not all, of the decline in the Nushagak District. Subsistence sockeye salmon harvests in the Kvichak River watershed, including Iliamna Lake and Lake Clark, historically the largest component of the Bristol Bay subsistence salmon fishery, declined by more than half during the 1990s and early 2000s. Local subsistence fishers attributed these lowered harvests to poor returns and scarcities of salmon in once reliable and abundant traditional harvest locations.

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TABLES AND FIGURES

Table 1. Population of the Bristol Bay Management Area, 1980, 1990, 2000, and 2005

	1980	1990			2000			2005
	Total Population	Total Population	Alaska Native		Total Population	Alaska Native		Total Population
			Number	Percent		Number	Percent	
Dillingham Census Area								
Aleknagik	154	185	154	83.2%	221	187	84.6%	241
Clarks Point	79	60	53	88.3%	75	69	92.0%	65
Dillingham	1,563	2,017	1,125	55.8%	2,466	1,503	60.9%	2,370
Ekuk	7	3	2	66.7%				0
Ekwok	77	77	67	87.0%	130	122	93.8%	118
Koliganek	117	181	174	96.1%	182	159	87.4%	167
Manokotak	294	385	368	95.6%	399	378	94.7%	437
New Stuyahok	331	391	375	95.9%	471	452	96.0%	461
Portage Creek	48	5	3	60.0%	36	31	86.1%	37
Togiak	470	613	535	87.3%	809	750	92.7%	779
Twin Hills	70	66	61	92.4%	69	65	94.2%	71
Remainder	22	29	8	27.6%	64	37	57.8%	46
Subtotal	3,232	4,012	2,925	72.9%	4,922	3,753	76.2%	4,792
Bristol Bay Borough								
King Salmon	545	696	108	15.5%	442	133	30.1%	420
Naknek	318	575	236	41.0%	678	319	47.1%	577
South Naknek	145	136	108	79.4%	137	115	83.9%	76
Remainder	86	3	3	100.0%	1	0	0.0%	0
Subtotal	1,094	1,410	455	32.3%	1,258	567	45.1%	1,073
Lake and Peninsula Borough[1]								
Egegik	75	122	86	70.5%	116	89	76.7%	81
Igiugig	33	33	26	78.8%	53	44	83.0%	50
Iliamna	94	94	62	66.0%	102	59	57.8%	86
Kokhonak	83	152	137	90.1%	174	158	90.8%	179
Levelock	79	105	87	82.9%	122	116	95.1%	54
Newhalen	87	160	151	94.4%	160	146	91.3%	180
Nondalton	173	178	159	89.3%	221	199	90.0%	203
Pedro Bay	33	42	38	90.5%	50	32	64.0%	62
Pilot Point	66	53	45	84.9%	100	86	86.0%	73
Pope-Vannoy Landing					8	4	50.0%	6
Port Alsworth	22	55	1	1.8%	104	23	22.1%	106
Port Heiden	92	119	86	72.3%	119	93	78.2%	89
Ugashik	13	7	6	85.7%	11	9	81.8%	15
Remainder	19	31	5	16.1%				22
Subtotal	869	1,151	889	77.2%	1,340	1,058	79.0%	1,206
Total	5,195	6,573	4,269	64.9%	7,520	5,378	71.5%	7,071

[1] Port Heiden is in the Alaska Peninsula Management Area; Chignik, Chignik Lagoon Chignik Lake, Ivanof Bay, and Perryville of this borough are in the Chignik Management Area and are excluded from this table. The "remainder" may include some population living outside the Bristol Bay Management Area.

Sources: Alaska Department of Labor 1991, 1980 and 1990; US Bureau of the Census 2001, for 2000; Alaska Department of Labor and Workforce Development 2006, for 2005.

Table 2. Number of Subsistence Permits Issued, Estimated Subsistence Salmon Harvests by Species, and Average Subsistence Salmon Harvest Per Permit, Bristol Bay Management Area, 1975 to 2005

Year	Permits Issued	Estimated Number of Salmon Harvested						Harvest per Permit
		Sockeye	Chinook	Chum	Pink	Coho	Total	
1975	686	175,400	8,600	7,500	1,300	8,500	201,300	293.4
1976	716	120,900	8,400	9,100	4,400	3,500	146,300	204.3
1977	738	127,900	7,000	9,100	300	6,600	150,900	204.5
1978	773	127,600	8,100	16,200	12,700	4,400	169,000	218.6
1979	829	116,500	10,300	7,700	500	7,300	142,300	171.7
1980	1,243	168,600	14,100	13,100	10,000	7,300	213,100	171.4
1981	1,112	132,100	13,000	11,500	2,600	12,200	171,400	154.1
1982	806	110,800	13,700	12,400	8,600	11,500	157,000	194.8
1983	834	149,400	13,500	10,500	900	7,100	181,400	217.5
1984	893	163,000	11,300	12,700	8,400	13,000	208,400	233.4
1985	1,033	149,758	9,710	5,568	728	9,049	174,813	169.2
1986	933	130,815	14,747	11,601	7,549	11,204	175,916	188.5
1987	998	135,493	14,356	7,895	689	9,453	167,886	168.2
1988	936	124,449	11,746	9,680	7,367	7,491	160,733	171.7
1989	955	127,408	9,725	7,356	799	12,210	157,498	164.9
1990	1,042	131,701	13,976	9,683	4,434	8,367	168,161	161.4
1991	1,197	139,731	15,452	6,655	584	14,122	176,544	147.5
1992	1,204	134,330	16,623	10,772	5,314	10,612	177,651	147.6
1993	1,206	136,207	20,787	6,559	1,049	9,206	173,808	144.1
1994	1,193	120,735	18,529	6,082	2,770	9,491	157,607	132.1
1995	1,119	104,086	15,722	4,580	677	7,378	132,443	118.4
1996	1,110	108,470	18,135	5,915	2,518	7,775	142,813	128.7
1997	1,166	116,991	19,159	2,974	668	6,201	145,992	125.2
1998	1,234	113,560	15,576	3,792	2,349	8,093	143,368	116.2
1999	1,219	122,281	13,009	3,653	420	6,143	145,506	119.4
2000	1,219	92,050	11,547	4,637	2,599	7,991	118,824	97.5
2001	1,226	92,041	14,412	4,158	839	8,406	119,856	97.8
2002	1,093	81,088	12,936	6,658	2,341	6,565	109,587	100.3
2003	1,182	95,690	21,231	5,868	1,062	7,816	131,667	111.4
2004	1,100	93,819	18,012	5,141	3,225	6,667	126,865	115.3
2005	1,076	98,511	15,212	6,102	1,098	7,889	128,811	119.7
31-year average	1,035	123,917	13,826	7,907	3,186	8,501	157,337	152.1
Percent of Harvest		78.8%	8.8%	5.0%	2.0%	5.4%		
10 year average	1,163	101,450	15,923	4,890	1,712	7,355	131,329	113.0
Percent of Harvest		77.2%	12.1%	3.7%	1.3%	5.6%		
5-year average	1,135	92,230	16,361	5,585	1,713	7,469	123,357	108.6
Percent of Harvest		74.8%	13.3%	4.5%	1.4%	6.1%		

Source: ADF&G, Division of Subsistence, Bristol Bay Area Subsistence Permit Database

Table 3. Ten-Year Average (1996 - 2005) Subsistence Salmon Harvests by District, Bristol Bay Area

District	Permits Issued	Estimated Harvests (Number of Salmon						Salmon per Permit
		Sockeye	Chinook	Chum	Pink	Coho	Total	
Naknek/Kvichak	514	70,860	1,428	621	641	1,061	74,611	145.2
Egegik	45	2,234	88	100	28	631	3,080	68.4
Ugashik	25	1,379	60	25	12	352	1,829	73.2
Nushagak	528	24,368	13,291	3,716	935	4,977	47,288	89.5
Togiak	53	2,608	1,042	426	97	334	4,508	84.6
Brsitol Bay	1,163	101,450	15,923	4,890	1,712	7,355	131,329	113.0

Source: Alaska Department of Fish and Game, Division of Subsistence Bristol Bay Subsistence Permit Database

Table 4. Number of Subsistence Permits Issued, Kvichak Watershed, 1983 - 2005[1]

	Igiugig	Iliamna/ Newhalen	Kokhanok	Levelock	Nondalton	Pedro Bay	Port Alsworth	Other Kvichak Residents	Subtotal, Local Residents	Other Alaska Residents	Total
1983	3	63	17	18	38	15	18	0	172	2	174
1984	8	53	19	19	43	15	16	2	175	3	178
1985	4	66	15	17	37	20	23	2	184	74	258
1986	6	58	20	21	29	17	24	5	180	3	183
1987		57	17	19	29	17	21	0	160	1	161
1988		59	22	18	31	14	19	1	164	5	169
1989	4	56	16	17	39	14	18	1	165	5	170
1990	7	49	14	18	37	17	23	1	166	17	183
1991	8	48	17	3	18	26	26	0	146	25	171
1992	4	61	14	16	24	23	27	0	169	33	202
1993	7	57	22	14	49	22	28	0	199	35	234
1994	5	51	21	7	38	17	29	0	168	41	209
1995	7	54	21	15	14	18	28	0	157	44	201
1996	6	60	21	9	28	20	25	0	169	42	211
1997	4	59	16	6	32	14	24	0	155	37	192
1998	4	55	15	6	36	18	29	0	163	42	205
1999	5	45	18	4	26	17	44	0	159	57	216
2000	8	47	22	14	24	10	38	1	164	48	212
2001	8	49	24	9	33	17	30	0	170	37	207
2002	8	53	27	7	20	15	19	0	149	31	180
2003	9	48	26	8	27	11	22	0	151	24	175
2004	6	60	25	3	40	22	25	0	181	25	206
2005	6	48	33	11	33	16	24	0	171	23	194
23-Year Average	6.0	54.6	20.1	12.1	31.5	17.2	25.2	0.6	166.8	28.4	195.3
Average, 1986 - 1995	6.0	55.0	18.4	14.8	30.8	18.5	24.3	0.8	167.4	20.9	188.3
Average, 1996 - 2005	6.4	52.4	22.7	7.7	29.9	16.0	28.0	0.1	163.2	36.6	199.8
Average, 1996 - 2000	5.4	53.2	18.4	7.8	29.2	15.8	32.0	0.2	162.0	45.2	207.2
Average, 2001 - 2005	7.5	50.8	26.2	8.7	29.5	15.2	26.3	0.2	164.3	31.3	195.7

[1] For 1983 through 1986, includes a small number of permits issued for fishing in areas outside the Kvichak watershed to local residents.
In 1983, 1984, and 1986 through 1989, only local watershed residents were eligible for permits.
Due to updates to the database, these data may differ slighly from that published in annual management reports.

Source: Bristol Bay Subsistence Permit Database, Division of Subsistence, ADF&G

Table 5. Subsistence harvest of sockeye salmon by community, in numbers of fish, Kvichak River drainage, Bristol Bay, 1963 - 2005 [a] [b]

Year	Levelock	Igiugig	Pedro Bay	Kokhanok	Iliamna-Newhalen	Nondalton	Port Alsworth	All Local Communities	Other [1]	Total
1963	600		14,000	7,000	10,000	25,000		56,600		56,600
1964	1,000	4,000	12,000	8,000	19,000	35,000		79,000		79,000
1965	1,000	3,300	9,800	10,200	9,700	35,500		69,500		69,500
1966	600	1,200	6,000	10,500	6,600	45,800		70,700		70,700
1967	1,400	3,400	9,900	10,200	9,100	29,600		63,600		63,600
1968	1,400	4,800	9,800	10,200	8,700	33,700		68,600		68,600
1969	1,000	5,100	4,200	15,000	4,900	44,000		74,200		74,200
1970	1,600	11,200	11,200	22,300	16,400	42,900		105,600		105,600
1971	1,600	6,500	10,100	12,800	8,500	22,100		61,600		61,600
1972	1,600	2,200	4,000	8,300	10,000	24,100		50,200		50,200
1973	4,800	2,200	2,900	9,200	10,200	8,500	1,300	39,100		39,100
1974	8,600	6,200	14,400	21,500	16,400	29,500	1,500	98,100		98,100
1975	5,300	6,400	8,300	18,000	26,700	48,700	2,100	115,500		115,500
1976	5,300	6,800	4,400	17,100	16,300	20,500	5,500	75,900		75,900
1977	2,600	6,000	5,600	14,300	11,400	27,200	4,900	72,000		72,000
1978	8,900	8,800	11,200	23,700	11,000	17,300	3,000	83,900		83,900
1979	4,400	6,600	3,500	16,200	15,900	14,700	4,200	65,500		65,500
1980	6,100	8,100	7,400	22,600	11,100	11,300	6,000	72,600		72,600
1981	6,600	5,400	9,700	16,500	15,400	15,200	6,800	75,600		75,600
1982	5,400	1,900	8,200	16,600	13,500	11,200	4,500	61,300		61,300
1983	4,800	3,300	10,400	20,100	23,800	29,400	4,700	96,500		96,500
1984	8,100	6,300	12,100	24,400	15,900	29,100	4,600	100,500		100,500
1985	6,600	3,400	12,900	21,900	22,300	14,900	4,500	86,500		86,500
1986	6,400	1,600	6,700	18,300	17,000	6,600	3,300	59,900		59,900
1987	5,700	[c]	7,300	16,500	27,500	11,800	3,200	72,000		72,000
1988	3,500	[c]	5,500	14,400	29,800	20,700	3,200	77,100	[d]	77,100
1989	5,100	1,200	6,700	13,000	24,700	18,500	2,200	71,400	[d]	71,400
1990	4,700	2,200	6,600	12,400	18,800	27,300	3,200	75,200	1,400	76,600
1991	1,029	1,712	9,739	17,184	29,094	4,163	2,755	65,676	1,110	66,786
1992	4,374	1,056	6,932	11,477	29,633	13,163	2,954	69,589	2,559	72,148
1993	4,699	1,397	6,226	18,810	19,067	17,890	3,254	71,343	2,780	74,123
1994	1,467	1,201	8,747	15,771	15,553	15,246	3,074	61,059	3,284	64,343
1995	3,756	497	5,359	14,412	20,134	4,188	2,892	51,238	3,441	54,679
1996	1,120	2,309	5,219	14,011	14,787	11,856	3,263	52,565	2,307	54,872
1997	1,062	2,067	5,501	8,722	19,513	17,194	2,348	56,407	3,101	59,508
1998	2,454	1,659	3,511	10,418	16,165	13,136	2,678	50,021	3,635	53,656
1999	1,276	1,608	5,005	10,725	14,129	17,864	4,282	54,889	2,834	57,723
2000	1,467	1,981	1,815	7,175	6,679	11,953	3,200	34,270	2,720	36,990
2001	908	779	2,118	9,447	8,132	7,566	1,958	30,908	1,901	32,808
2002	625	2,138	2,687	9,847	9,417	5,508	1,201	31,423	1,578	33,001
2003	737	1,081	2,135	9,771	13,824	8,016	1,370	36,934	1,591	38,525
2004	1,000	1,026	4,803	11,869	21,652	8,789	2,455	51,594	1,631	53,225
2005	914	1,017	4,162	16,801	12,010	8,824	2,457	46,185	2,078	48,263
43-Year Average, 1963 - 2005	3,293	3,491	7,180	14,364	15,823	20,127	3,298	66,565	2,372	67,448
1963 - 1985 Average	3,883	5,141	8,783	15,504	13,600	26,748	4,123	75,765		75,765
Recent 20-Year Average (1986 - 2005)	2,614	1,474	5,338	13,052	18,379	12,513	2,762	55,985	2,372	57,883
1963 - 75 Average	2,346	4,708	8,969	12,554	12,015	32,646	1,633	73,254		73,254
1976 - 85 Average	5,880	5,660	8,540	19,340	15,660	19,080	4,870	79,030		79,030
1986 - 95 Average	4,073	1,358	6,980	15,225	23,128	13,955	3,003	67,451	2,429	68,908
1996 - 05 Average	1,156	1,567	3,696	10,879	13,631	11,071	2,521	44,520	2,338	46,857
Average, 1996 - 2000	1,476	1,925	4,210	10,210	14,255	14,401	3,154	49,630	2,919	52,550
Average, 2001 - 2005	837	1,208	3,181	11,547	13,007	7,741	1,888	39,409	1,756	41,164

[a] Harvests are extrapolated for all permits issued, based on those returned. Harvest estimates from before 1991 are rounded to the nearest hundred fish. This table reports harvest estimates as they have appeared in Annual Management Reports.

[b] Harvest estimates prior to 1990 are based on the community where the permit was issued; estimates from 1990 to the present are based on community of residence and include fish caught only in the Kvichak District.

[c] No permits issued.

[d] No permits issued. Only residents of the Naknek/Kvichak watershed could obtain subsistence permits.

[1] Subsistence harvests by non-Kvichak River watershed residents.

Source: Weiland et al. 2003:112 for 2000 to 2002; ADF&G 2000a:120 for 1979 to 1999; ADF&G 1985 for 1965 to 1978; Schroeder etal. 1987:365 for 1963 and 1964

Table 6. Uses and Harvests of Fish Other Than Salmon, Bristol Bay Communities[1]

Community and Year	Percentage of Households					Average Pounds Harvested	
	Use	Fish for	Harvest	Receive	Give	Per Household	Per Person
Aleknagik 89	94.7	89.5	89.5	73.7	71.1	208.3	61.4
Clark's Point 89	94.1	82.4	82.4	82.4	70.6	113.4	34.4
Dillingham 84	75.0	56.2	54.9	39.9	19.6	51.6	17.5
Egegik 84	64.0	60.0	60.0	24.0	40.0	36.5	15.7
Ekwok 87	75.9	72.4	62.1	62.1	37.9	229.4	68.6
Igiugig 92	100.0	100.0	100.0	80.0	80.0	392.0	100.5
Iliamna 91	87.0	73.9	73.9	65.2	43.5	249.7	76.6
King Salmon 83			76.7			48.1	15.9
Kokhanok 92	91.7	86.1	86.1	72.2	61.1	469.9	105.7
Koliganek 87	92.9	81.0	81.0	69.0	57.1	369.7	95.3
Levelock 92	90.0	76.7	73.3	76.7	63.3	186.6	65.9
Manokotak 99	86.4	77.8	76.5	76.5	75.3	163.8	37.3
Naknek 83			75.0			58.0	18.6
New Stuyahok 87	100.0	85.0	82.5	82.5	62.5	171.9	36.0
Newhalen 91	100.0	96.2	92.3	73.1	46.2	185.1	37.6
Nondalton 83		90.5	90.5	23.8		906.4	174.6
Pedro Bay 96	76.9	53.8	53.8	53.8	30.8	85.6	25.9
Pilot Point 87	94.1	94.1	94.1	35.3	58.8	55.8	15.5
Port Alsworth 83		61.5	61.5	7.7		42.0	11.6
Port Heiden 87	91.9	62.2	62.2	70.3	45.9	32.6	11.7
South Naknek 92	85.7	77.1	74.3	68.6	48.6	64.4	20.1
Togiak 99	89.0	83.5	83.5	56.6	66.4	185.1	44.8
Twin Hills 99	91.7	91.7	91.7	75.0	91.7	302.9	101.0
Ugashik 87	100.0	100.0	100.0	0.0	40.0	72.2	36.1

[1] Information for the most recent year for which data are available.

Source: Scott et al. 2001; BBNA and ADF&G 1996; Kenner et al. 2003

Table 7. Nonsalmon Finfish Known to be Used for Subsistence Purposes in the Bristol Bay Area

Common English Name	Scientific Name	Yup'ik Name	Dena'ina Name
Arctic Grayling	*Thymallus arcticus*	*Nakrullugpak* *Culugpauk*	*Ch'dat'an*
Blackfish	*Dallia pectoralis*	*Can'giiq*	*Huzhegh*
Burbot	*Lota lota*	*Manignaq* [a] *Atgiaq* [b]	*Ch'unya*
Dolly Varden[c]	*Salvelinus malma*	*Yugyaq* [d] *Anerrluaq* *Anyuk*	*Qak'elay*
Lake Trout	*Salvelinus namaycush*	*Cikignaq*	*Zhuk'udghuzha*
Longnose Sucker	*Catosomus catostomus*	*Cungartak*	*Duch'ehdi*
Northern Pike	*Esox lucius*	*Cuukvak*	*Ghelguts'i*
Rainbow Smelt	*Osmerus mordax*	*Iqalluaq*	
Rainbow Trout	*Oncorhynchus mykiss*	*Talaariq*	*Tuni*
Broad Whitefish[e]	*Coregonus nasus*	*Akakiik*	*Telay*
Humpback Whitefish[e]	*Coregonus pidschian*	*Uraruq*	*Q'untuq'*
Round Whitefish[e]	*Prosopium cylindraceum*	*Uraruq*	*Hesten*
Least Cisco	*Coregonus sardinella*	*Cavirrutnaq*	*Ghelguts'i k'una*
Herring, Pacific	*Clupea harengus pallasi*	*Iqalluarpak*	
Herring Spawn on Kelp		*Melucuaq*	
Starry Flounder	*Platichthys stellatus*	*Naternaq*	
Halibut	*Hippoglossus stenolepis*	*Naternarpak*	
Pacific Cod	*Cadus macrocephalus*	*Ceturrnaq*	
Sculpin	Unknown	*Kayutaq*	
Capelin	*Mallotus villosus*	*Cikaaq*	
Yellowfin Sole	*Limanda aspera*	*Sagiq*	

[a] Nushagak River villages.

[b] Manokotak, Aleknagik, Twin Hills, Togiak.

[c] Also includes the closely related Arctic char,*Salvelinus alpinus*.

[d] At Togiak, Manokotak, and Aleknagik, and perhaps elsewhere, there are three Yup'ik namesrfo Dolly Varden/Arctic char. *Yugyak* probably refers to resident Dolly Varden/char.*Anerrluak*, called "Togiak trout" in the local English dialect, probably refers to anadromous fish taken in fresh water. Finally, *anyuk* or "sea run dollies" are Dolly Varden or char taken in salt water. See Fall et al. 1996:16-20 for further discussion of these distinctions.

[e] Broad whitefish are rare to absent in the Bristol Bay region. *A'kakiik*" is the word used at Aleknagik and Manokotak to refer to whitefish they receive from Kuskokwim River communities, where broad whitefish are common. Humpback whitefish are caught in the Iliamna Lake subregion and called "*uraruq*." "*Uraruq*" is used for round whitefish in the Togiak and Nushagak drainages.

Source: Fall et al. 1996

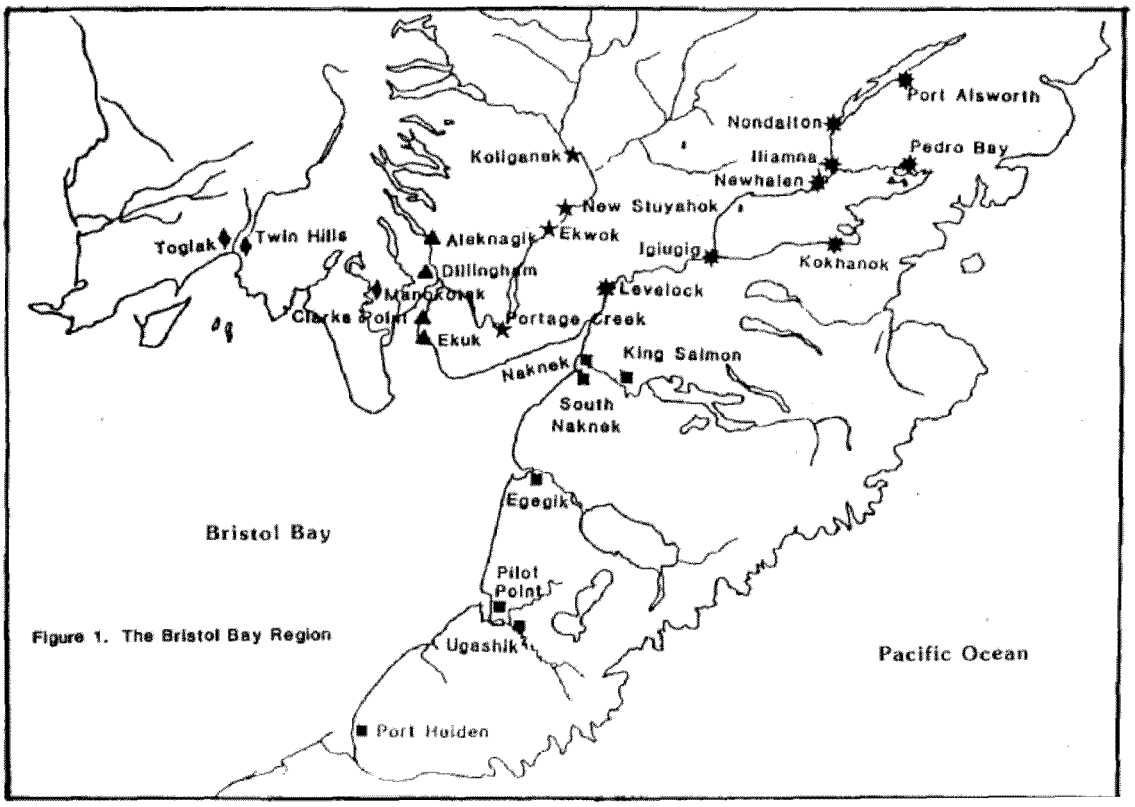


Figure 1: The Bristol Bay Region

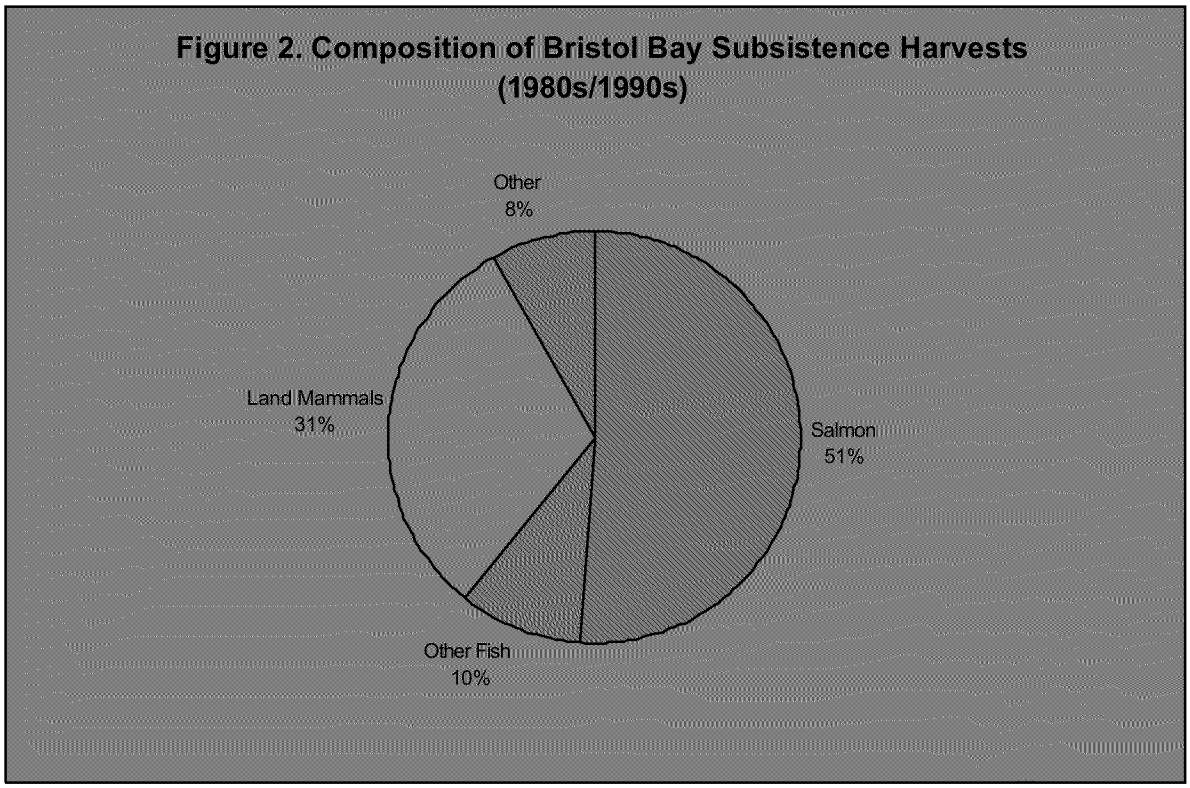


Figure 3. Number of Bristol Bay S ubsistence Salmon Permits Issued, 1975 - 2005

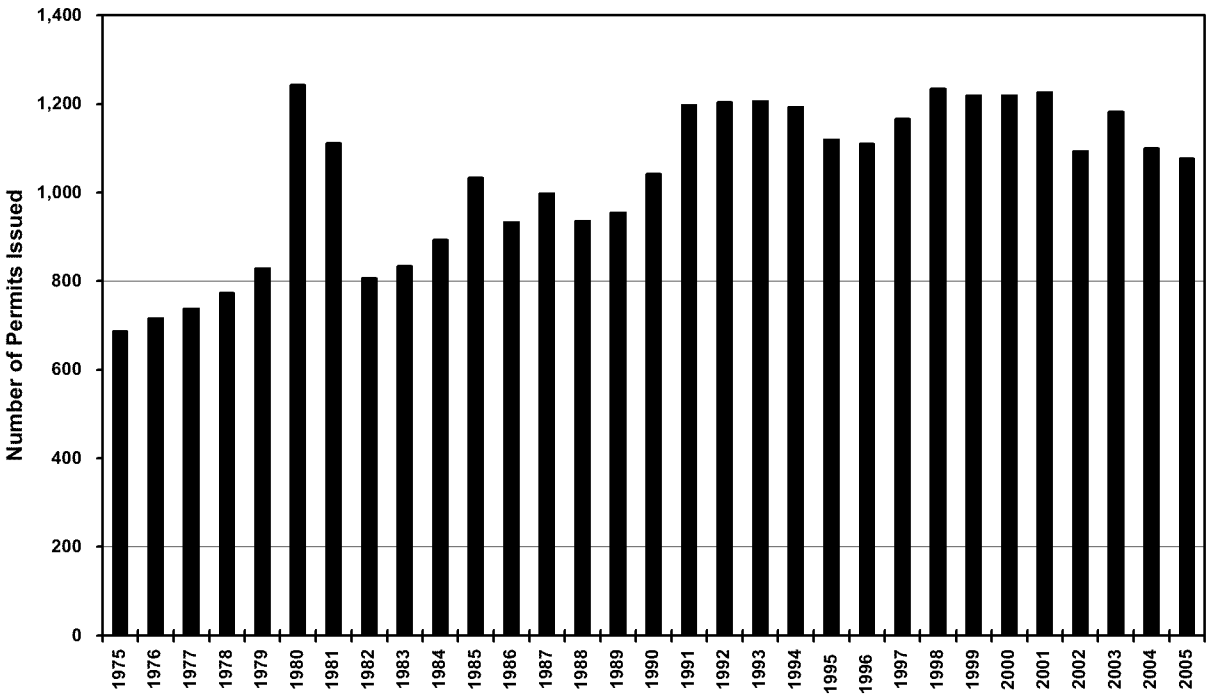


Figure 4. Percentage of Bristol Bay Subsistence Salmon Permits Issued by Area of Residence of Permit Holder, 1992 - 2005

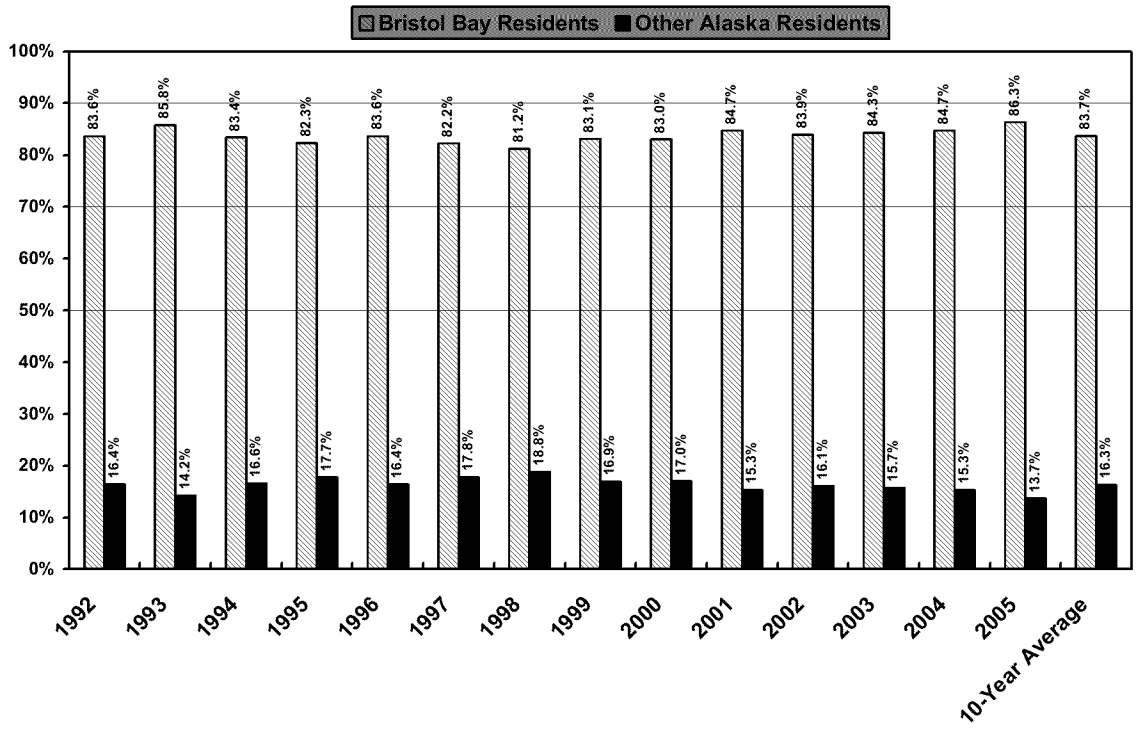


Figure 5. Estimated Subsistence Salmon Harvests, Bristol Bay Management Area, 1975 - 2005

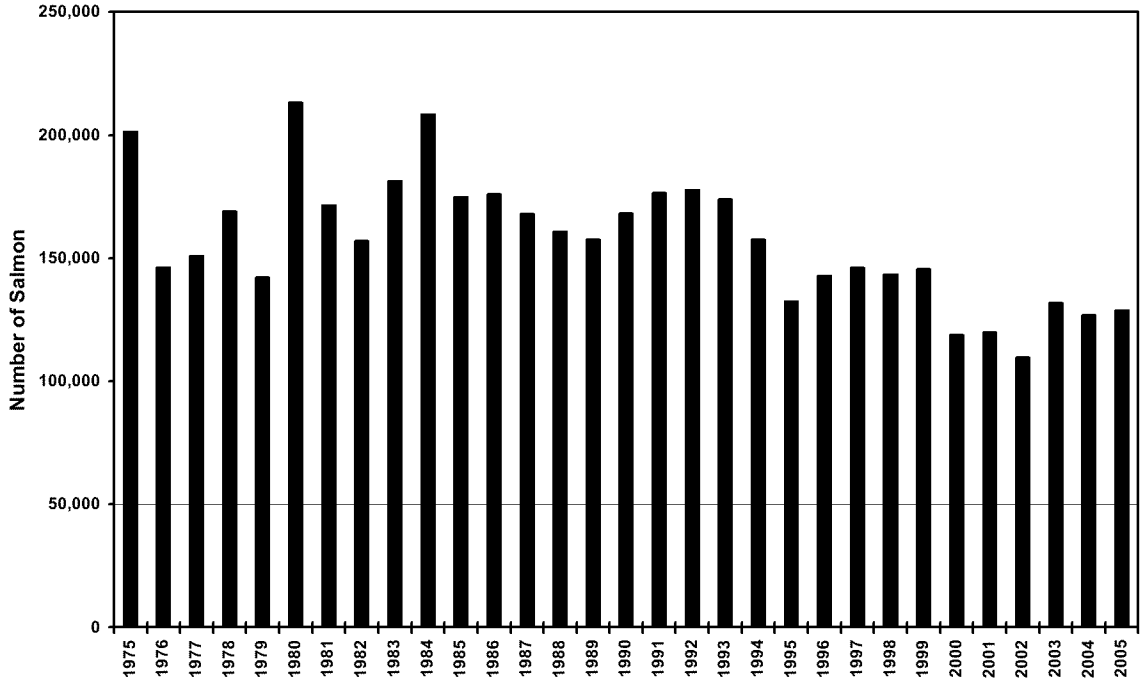
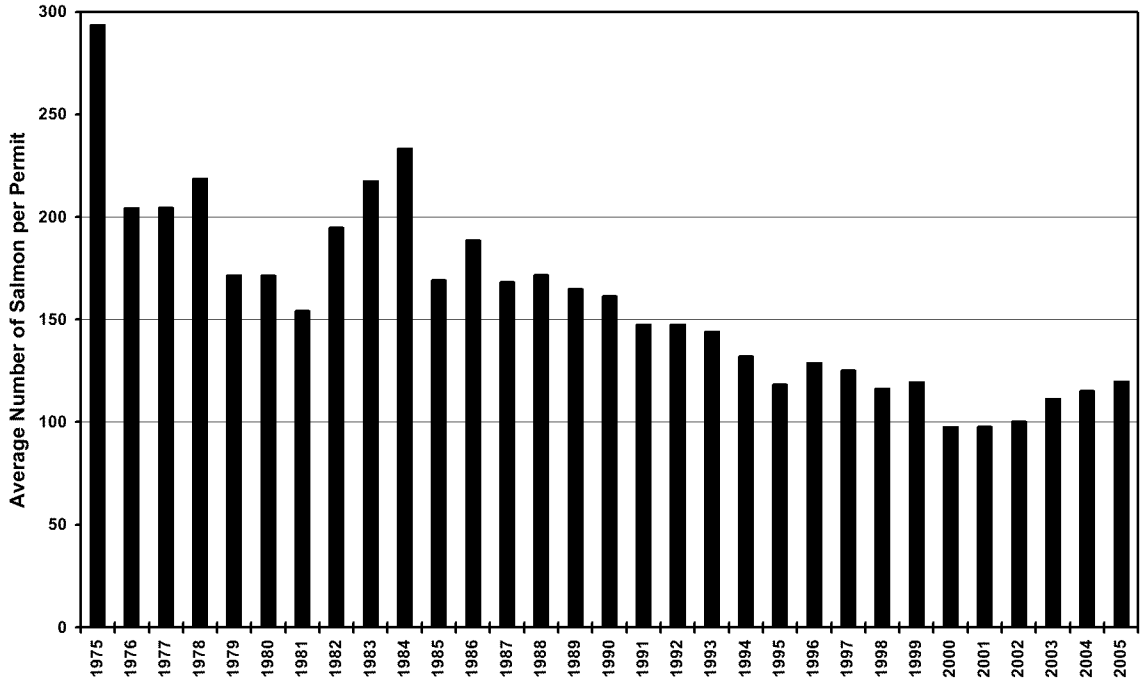
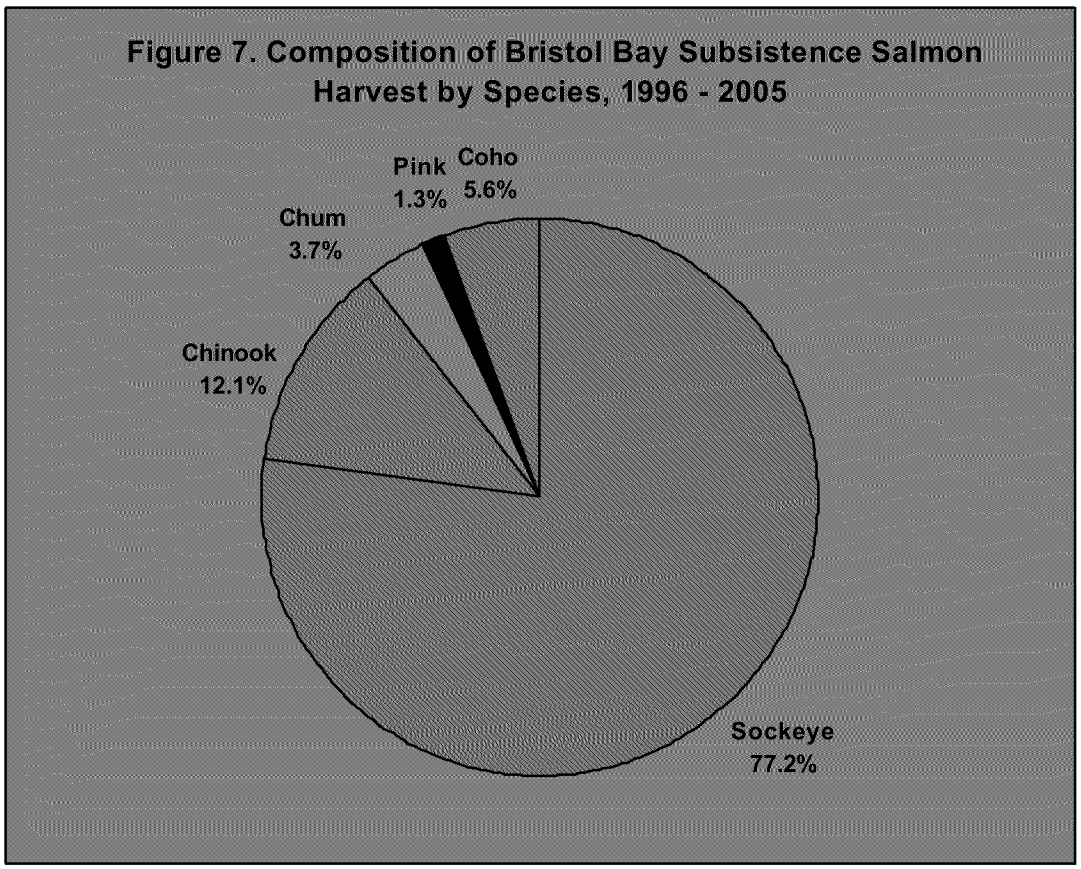


Figure 6. Average Salmon Harvest per Subsistence Permit, Bristol Bay Management Area, 1975 - 2005





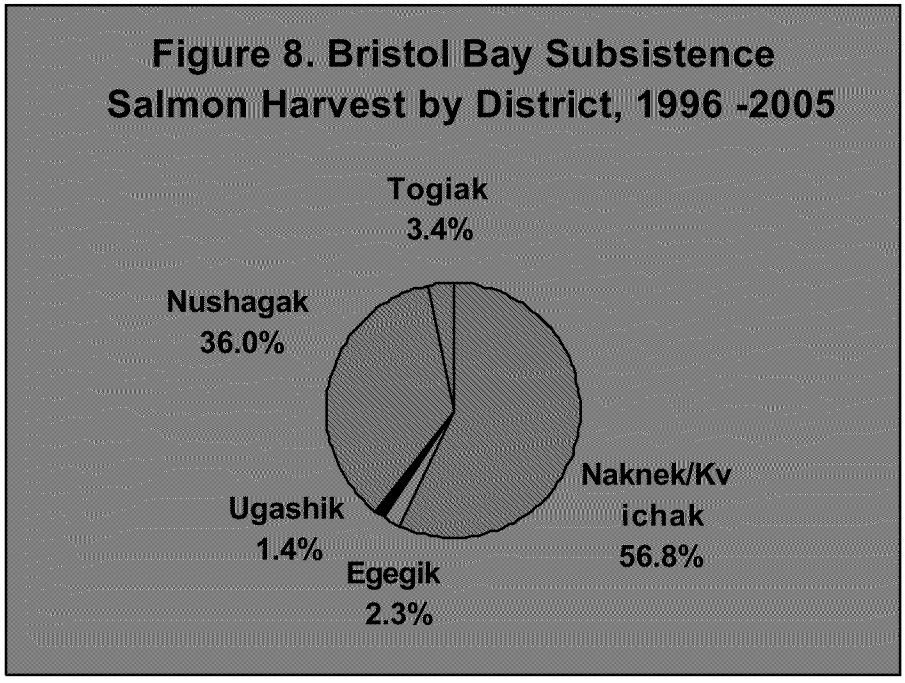


Figure 9. Percentage of Bristol Bay Subsistence Harvest by Area of Residence, 1992 - 2005

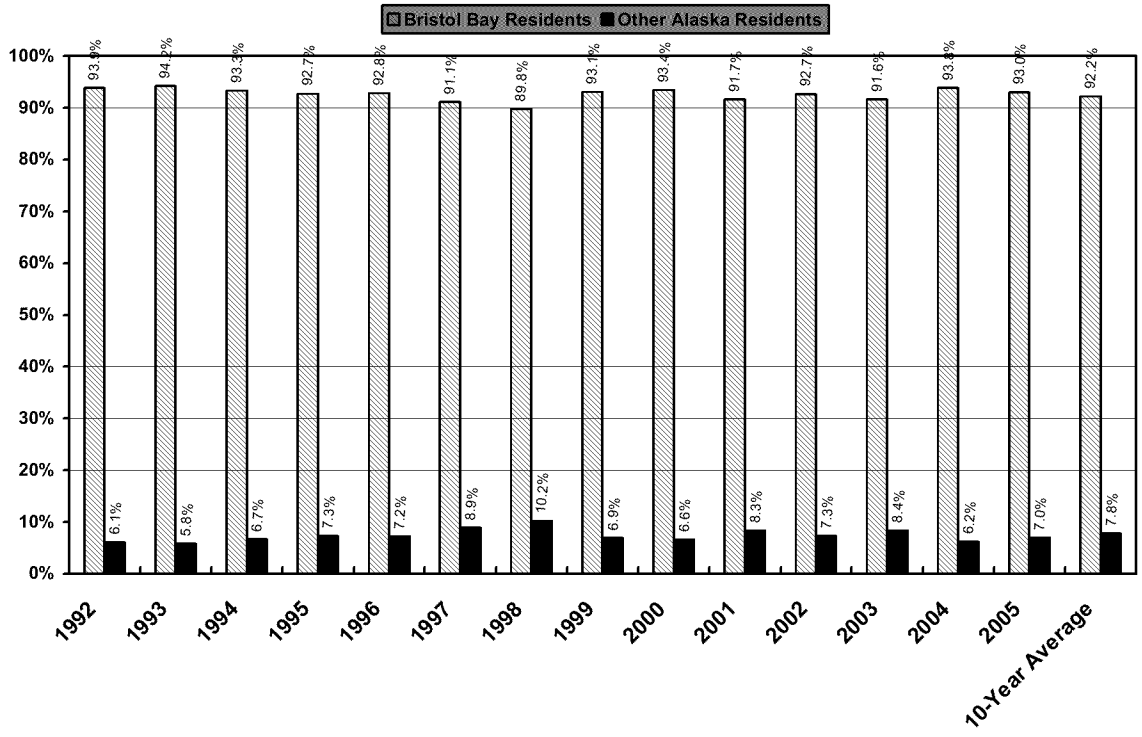


Figure 10. Average Subsistence Salmon Harvest per Permit, 10-Year Average, 1996 - 2005, Bristol Bay Area, by District

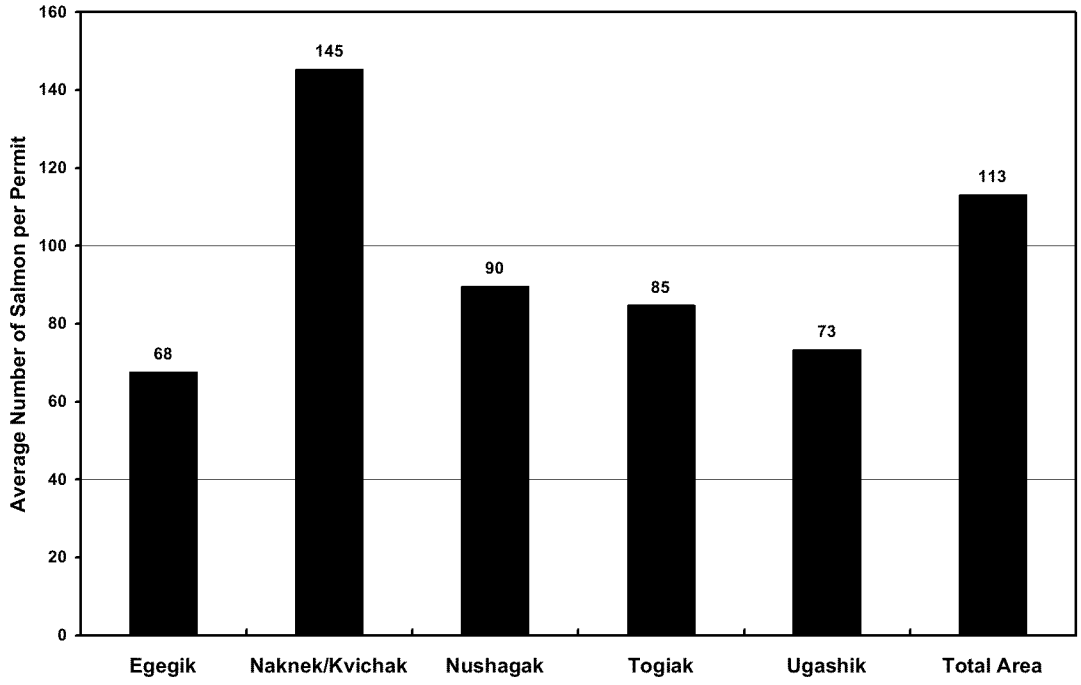


Figure 11. Number of Subsistence Salmon Permits Issued, Kvichak Watershed, Bristol Bay Area, 1983 - 2005

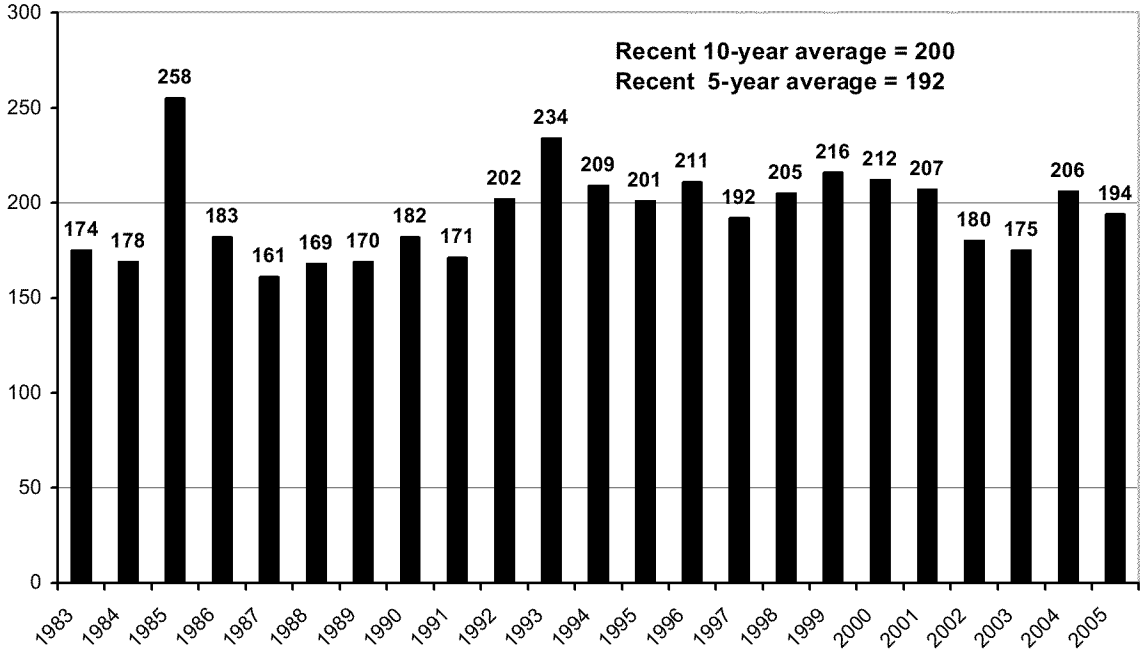


Figure 12. Estimated Subsistence Harvests of Sockeye Salmon, Kvichak Watershed, 1963 - 2005

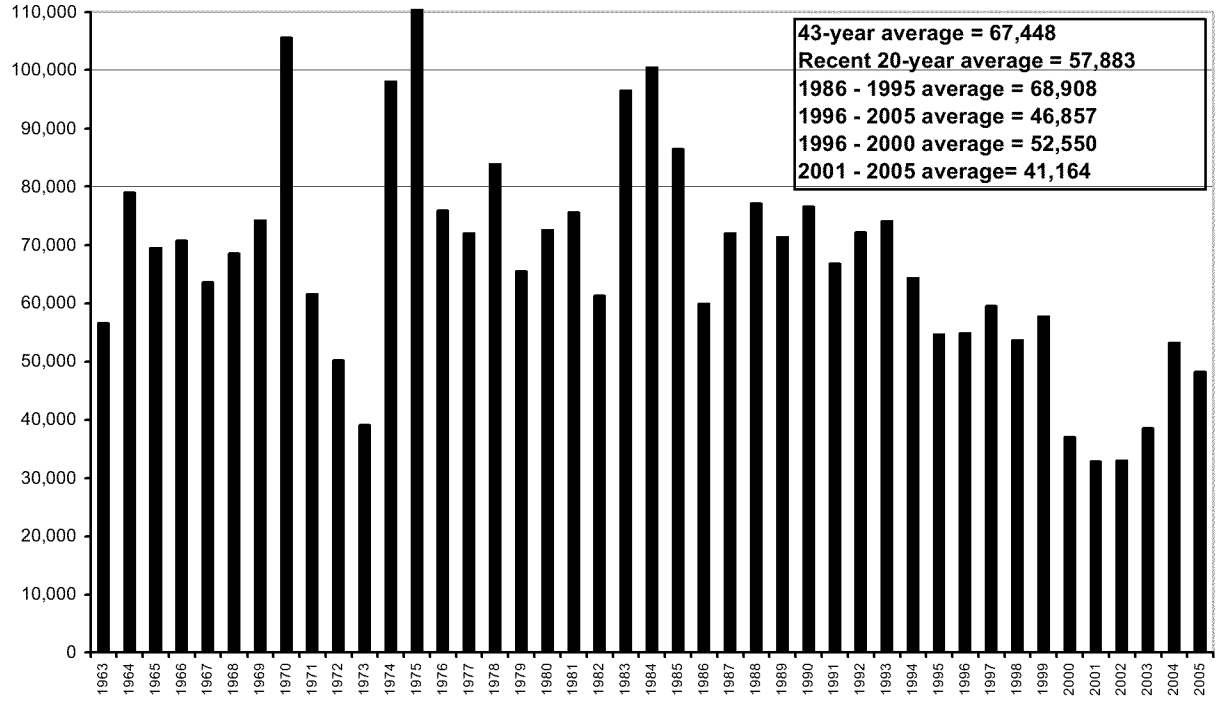


Figure 13. Average Subsistence Sockeye Salmon Harvest per Permit, Kvichak Watershed, 1983 - 2005

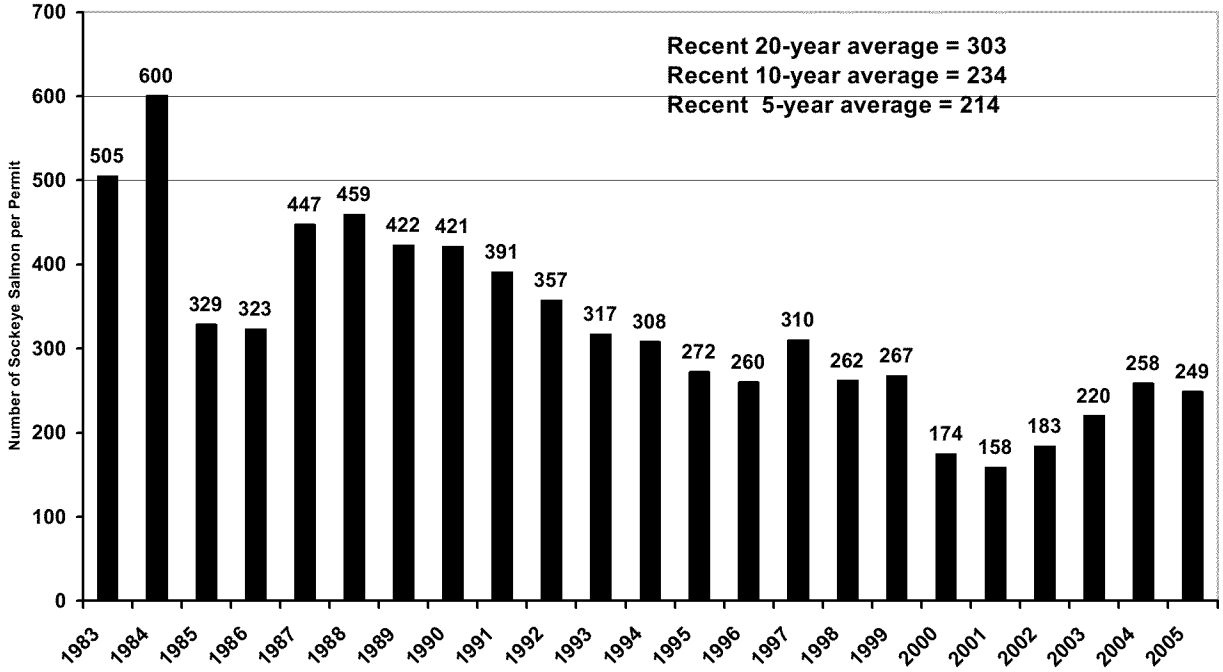


Figure 14. Average Subsistence Sockeye Salmon Harvest per Permit, Local Community Residents, Kvichak Watershed, 1983 - 2005

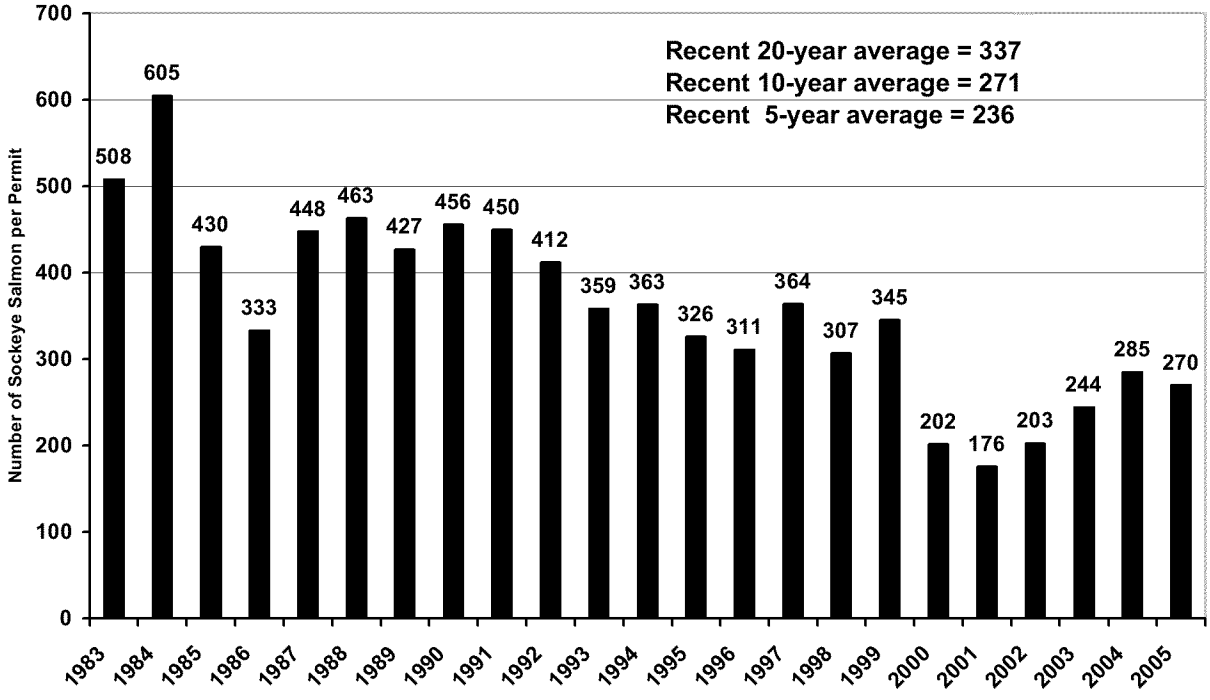


Figure 15. Kvichak Watershed Subsistence Fishery: Harvest of Sockeye Salmon per Day Fished, 1983 - 2005

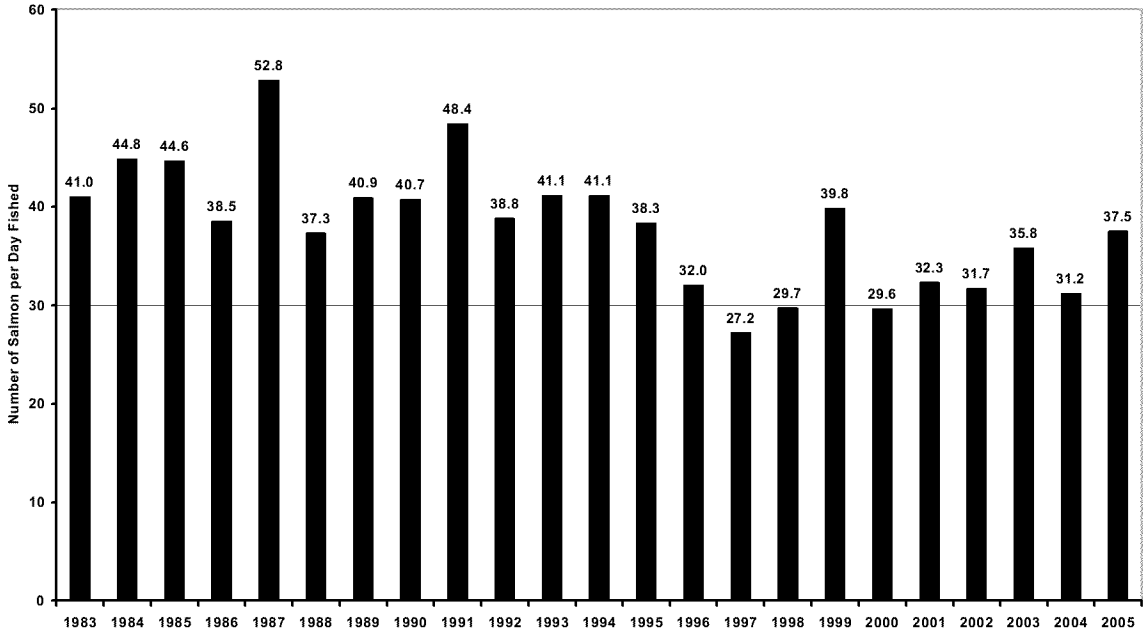
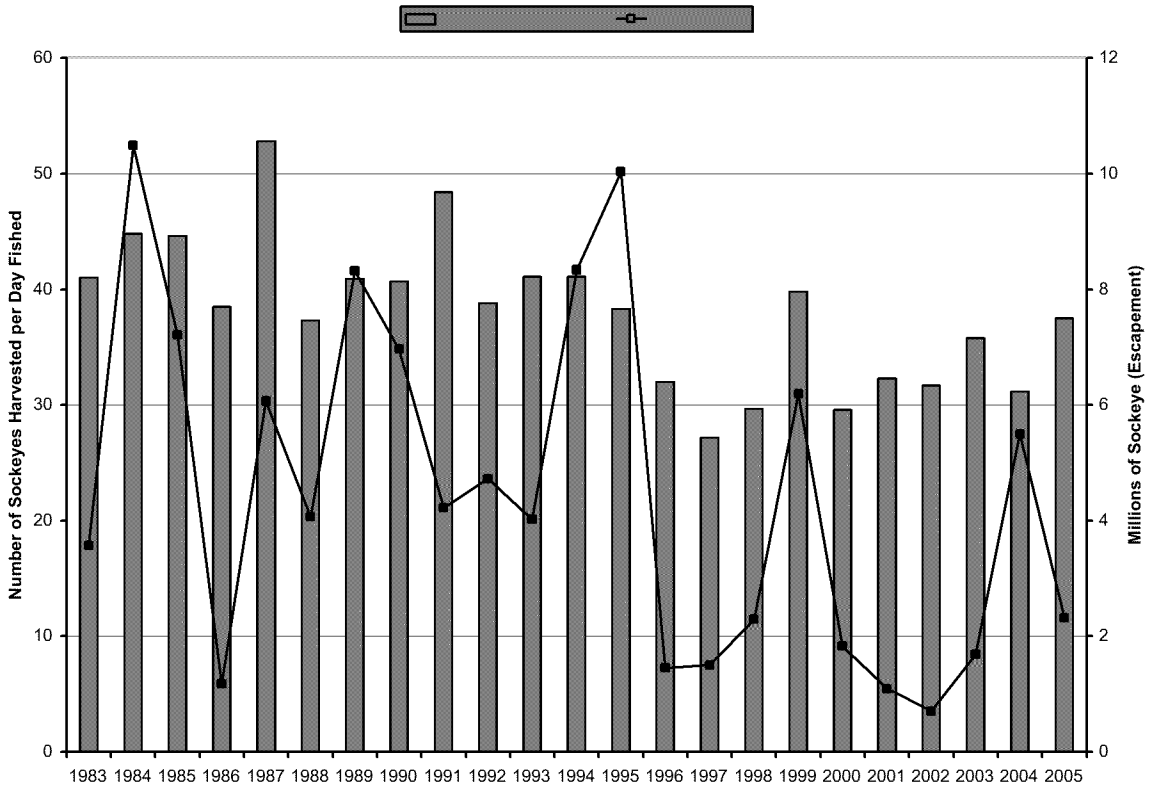


Figure 16. Escapement of Sockeye Salmon into the Kvichak Watershed Compared to Average Subsistence Harvest per Day Fished, 1983 - 2005



Appendix Table 1. Subsistence salmon harvest by district and species, Bristol Bay, 1985-2005. [a] [b]

Year	Permits Issued	Sockeye	Chinook	Chum	Pink	Coho	Total
			NAKNEK KVICHAK DISTRICT				
1985	544	107,543	1,179	540	27	1,103	110,392
1986	412	77,283	1,295	695	2,007	650	81,930
1987	407	86,706	1,289	756	490	1,106	90,347
1988	391	88,145	1,057	588	917	813	91,520
1989	411	87,103	970	693	277	1,927	90,970
1990	466	92,326	985	861	1,032	726	95,930
1991	518	97,101	1,152	1,105	191	1,056	100,605
1992	571	94,304	1,444	2,721	1,601	1,152	101,222
1993	560	101,555	2,080	2,476	762	2,025	108,898
1994	555	87,662	1,843	503	460	1,807	92,275
1995	533	75,644	1,431	1,159	383	1,791	80,407
1996	540	81,305	1,574	816	794	1,482	85,971
1997	533	85,248	2,764	478	422	1,457	90,368
1998	567	83,095	2,433	784	1,063	1,592	88,967
1999	528	85,315	1,567	725	210	856	88,674
2000	562	61,817	894	560	845	937	65,053
2001	506	57,250	869	667	383	740	59,909
2002	471	52,805	837	909	1,137	943	56,632
2003	489	61,443	1,221	259	198	812	63,934
2004	481	71,110	1,075	469	1,080	566	74,300
20 Year Average	502	81,738	1,398	888	1,094 [c]	1,177	85,915
1985-1994 Average	484	91,973	1,329	1,094	1,203 [c]	1,237	96,409
1995-2004 Average	521	71,503	1,466	683	984 [c]	1,118	75,421
2005	462	69,211	1,047	546	275	1,224	72,302
			EGEGIK DISTRICT				
1985	23	582	14	21	1	203	821
1986	41	1,052	69	58	21	319	1,519
1987	49	3,350	87	139	2	284	3,862
1988	52	1,405	97	87	54	333	1,976
1989	50	1,636	50	33	1	414	2,134
1990	61	1,105	53	85	39	331	1,613
1991	70	4,549	82	141	32	430	5,234
1992	80	3,322	124	270	51	729	4,496
1993	69	3,633	128	148	15	905	4,829
1994	59	3,208	166	84	153	857	4,468
1995	60	2,818	86	192	100	690	3,886
1996	44	2,321	99	89	85	579	3,173
1997	34	2,438	101	21	5	740	3,304
1998	36	1,795	44	33	52	389	2,314
1999	42	2,434	106	35	2	806	3,384
2000	31	842	16	11	0	262	1,131
2001	57	2,493	111	105	16	928	3,653
2002	53	1,892	65	34	12	356	2,359
2003	62	3,240	84	32	10	297	3,663
2004	46	2,618	169	410	91	1,423	4,711
20 Year Average	51	2,337	88	101	56 [c]	564	3,126
1985-1994 Average	55	2,384	87	107	64 [c]	481	3,095
1995-2004 Average	47	2,289	88	96	48 [c]	647	3,158
2005	45	2,267	81	231	2	526	3,106

Continued

Appendix Table 1. (page 2 of 3)

Year	Permits Issued	Sockeye	Chinook	Chum	Pink	Coho	Total
			UGASHIK DISTRICT				
1985	9	233	17	7		143	400
1986	27	1,080	83	48	21	335	1,567
1987	22	892	104	51	29	272	1,348
1988	23	1,400	84	55	35	330	1,904
1989	22	1,309	32	35	2	214	1,592
1990	37	1,578	51	143	120	280	2,172
1991	38	1,403	121	168	42	614	2,348
1992	37	2,348	106	79	8	397	2,938
1993	39	1,766	86	107	24	495	2,478
1994	31	1,587	126	42	38	579	2,372
1995	20	1,513	56	18	6	290	1,883
1996	26	1,247	50	21	7	298	1,623
1997	28	2,785	169	39	23	311	3,327
1998	27	1,241	59	75	82	485	1,942
1999	25	1,365	35	5	0	271	1,675
2000	31	1,927	51	34	1	467	2,481
2001	24	1,197	61	8	2	357	1,624
2002	23	1,294	51	14	2	460	1,821
2003	23	1,113	31	30	0	392	1,567
2004	21	804	64	9	4	234	1,116
20 Year Average	27	1,404	72	49	32 [c]	361	1,909
1985-1994 Average	29	1,360	81	74	44 [c]	366	1,912
1995-2004 Average	25	1,449	63	25	19 [c]	356	1,906
2005	22	818	27	18	2	249	1,114
			NUSHAGAK DISTRICT				
1985	406	38,000	7,900	4,000	600	6,100	56,600
1986	424	49,000	12,600	10,000	5,400	9,400	86,400
1987	474	40,900	12,200	6,000	200	6,200	65,500
1988	441	31,086	10,079	8,234	6,316	5,223	60,938
1989	432	34,535	8,122	5,704	407	8,679	57,447
1990	441	33,003	12,407	7,808	3,183	5,919	62,320
1991	528	33,161	13,627	4,688	292	10,784	62,552
1992	476	30,640	13,588	7,076	3,519	7,103	61,926
1993	500	27,114	17,709	3,257	240	5,038	53,358
1994	523	26,501	15,490	5,055	2,042	5,338	54,426
1995	484	22,793	13,701	2,786	188	3,905	43,373
1996	481	22,935	15,941	4,704	1,573	5,217	50,370
1997	538	25,080	15,318	2,056	218	3,433	46,106
1998	562	25,217	12,258	2,487	1,076	5,316	46,355
1999	548	29,387	10,057	2,409	124	3,993	45,969
2000	541	24,451	9,470	3,463	1,662	5,983	45,029
2001	554	26,939	11,760	3,011	378	5,993	48,080
2002	520	22,777	11,281	5,096	1,179	4,565	44,897
2003	527	25,491	18,686	5,064	403	5,432	55,076
2004	511	17,491	15,610	3,869	1,944	4,240	43,154
20 Year Average	496	29,325	12,890	4,838	2,789 [c]	5,893	54,494
1985-1994 Average	465	34,394	12,372	6,182	4,092 [c]	6,978	62,147
1995-2004 Average	527	24,256	13,408	3,494	1,487 [c]	4,808	46,841
2005	502	23,916	12,529	5,006	793	5,596	47,841

Continued

Appendix Table 1. (page 3 of 3)

Year	Permits Issued	Sockeye	Chinook	Chum	Pink	Coho	Total
			TOGIAK DISTRICT				
1985	51	3,400	600	1,000	100	1,500	6,600
1986	29	2,400	700	800	100	500	4,500
1987	46	3,600	700	1,000		1,600	6,900
1988	29	2,413	429	716	45	792	4,395
1989	40	2,825	551	891	112	976	5,355
1990	37	3,689	480	786	60	1,111	6,126
1991	43	3,517	470	553	27	1,238	5,805
1992	40	3,716	1,361	626	135	1,231	7,069
1993	38	2,139	784	571	8	743	4,245
1994	25	1,777	904	398	77	910	4,066
1995	22	1,318	448	425	0	703	2,894
1996	19	662	471	285	59	199	1,676
1997	31	1,440	667	380	0	260	2,747
1998	42	2,211	782	412	76	310	3,791
1999	76	3,780	1,244	479	84	217	5,804
2000	54	3,013	1,116	569	90	342	5,130
2001	92	4,162	1,612	367	61	388	6,590
2002	36	2,319	703	605	10	241	3,878
2003	92	4,403	1,208	483	451	883	7,428
2004	46	1,795	1,094	383	108	204	3,584
20 Year Average	44	2,729	816	586	76 [c]	717	4,929
1985-1994 Average	38	2,948	698	734	83 [c]	1,060	5,506
1995-2004 Average	51	2,510	934	439	69 [c]	375	4,352
2005	45	2,299	1,528	301	26	295	4,448
			TOTAL BRISTOL BAY AREA				
1985	1,033	149,758	9,710	5,568	728	9,049	174,813
1986	933	130,815	14,747	11,601	7,549	11,204	175,916
1987	998	135,493	14,356	7,895	689	9,453	167,886
1988	936	124,449	11,746	9,680	7,367	7,491	160,733
1989	955	127,408	9,725	7,356	799	12,210	157,498
1990	1,042	131,701	13,976	9,683	4,434	8,367	168,161
1991	1,197	139,731	15,452	6,655	584	14,122	176,544
1992	1,204	134,330	16,623	10,772	5,314	10,612	177,651
1993	1,206	136,207	20,787	6,559	1,049	9,206	173,808
1994	1,193	120,735	18,529	6,082	2,770	9,491	157,607
1995	1,119	104,086	15,722	4,580	677	7,378	132,443
1996	1,110	108,470	18,136	5,915	2,518	7,775	142,813
1997	1,166	116,991	19,159	2,974	668	6,201	145,992
1998	1,234	113,560	15,576	3,792	2,349	8,093	143,368
1999	1,219	122,281	13,009	3,653	420	6,143	145,506
2000	1,219	92,050	11,547	4,637	2,599	7,991	118,824
2001	1,226	92,041	14,412	4,158	839	8,406	119,856
2002	1,093	81,088	12,936	6,658	2,341	6,565	109,587
2003	1,182	95,690	21,231	5,868	1,062	7,816	131,667
2004	1,100	93,819	18,012	5,141	3,225	6,667	126,865
20 Year Average	1,118	117,535	15,270	6,461	4,047 [c]	8,712	150,377
1985-1994 Average	1,070	133,063	14,565	8,185	5,487 [c]	10,121	169,062
1995-2004 Average	1,167	102,008	15,974	4,738	2,606 [c]	7,304	131,692
2005	1,076	98,511	15,212	6,102	1,098	7,889	128,811

[a] Harvests are extrapolated for all permits issued, based on those returned. Harvests prior to 1985 are rounded to the nearest hundred fish.

[b] Permit and harvest estimates prior to 1989 are based on the community where the permit was issued; estimates from 1989 to the present are based on the area fished, as first recorded on the permit.

[c] Includes even years only.

Appendix Table 2. Subsistence salmon harvest by species, in numbers of fish, by district and location fished, Bristol Bay, 2005. [a]

Area and River System	Permits Issued [b]	Estimated Number of Salmon Harvested					
		Sockeye	Chinook	Chum	Pink	Coho	Total
NAKNEK-KVICHAK DISTRICT	462	69,211	1,047	546	275	1,224	72,302
Naknek River	268	20,947	887	205	132	742	22,912
Kvichak River/Iliamna Lake:	194	48,263	160	341	143	482	49,390
Alagnak (Branch) River	0	0	0	0	0	0	0
Igiugig	5	903	2	0	14	1	920
Iliamna (community)	2	987	0	0	0	0	987
Iliamna Lake	19	1,367	0	0	0	0	1,367
Kokhanok	34	17,520	29	322	125	392	18,387
Kvichak River	4	366	0	0	0	18	384
Lake Clark: General	29	2,798	0	0	0	0	2,798
Levelock	12	1,028	127	19	4	70	1,248
Newhalen River	44	14,282	0	0	0	0	14,282
Nondalton Village	22	4,307	3	1	0	2	4,312
Pedro Bay	18	4,312	0	0	0	0	4,312
Port Alsworth	4	264	0	0	0	0	264
Six Mile Lake	1	130	0	0	0	0	130
EGEGIK DISTRICT	45	2,267	81	231	2	526	3,106
UGASHIK DISTRICT	22	818	27	18	2	249	1,114
NUSHAGAK DISTRICT	502	23,916	12,529	5,006	793	5,596	47,841
Wood River	112	3,845	1,718	220	28	720	6,531
Lower Nushagak River	29	1,092	1,402	186	6	360	3,046
Upper Nushagak River	81	7,439	4,471	3,452	538	1,134	17,035
Dillingham Beaches	210	7,647	4,202	872	158	2,657	15,536
Nushagak Bay Commercial	43	1,909	599	255	62	443	3,267
Igushik/Snake River	24	1,545	137	13	0	194	1,888
Nushagak, Site Unspecified	3	440	0	7	1	89	537
TOGIAK DISTRICT	45	2,299	1,528	301	26	295	4,448
TOTAL BRISTOL BAY	1,076	98,511	15,212	6,102	1,098	7,889	128,811

[a] Harvests are extrapolated for all permits issued, based on those returned and on the area fished as recorded on the permit. Due to rounding, the sum of columns and rows may not equal the estimated total. Of 1,076 permits issued for the management area, 979 were returned (91.0%).

[b] Sum of sites may exceed district totals, and sum of districts may exceed area total, because permittees may use more than one site.

Appendix Table 3. Subsistence salmon harvest by community, Nushagak District, Bristol Bay, 1985-2005.[ab]

Year	Dillingham[e]	Manokotak	Aleknagik	Ekwok	New Stuyahok	Koliganek	Other[f]	Total
1985	22,900	3,600	1,600	7,000	14,500	6,800		56,400
1986	31,900	5,500	6,900	7,800	26,400	8,200		86,700
1987	33,500	5,900	3,100	6,400	11,400	4,900		65,200
1988	29,600 [d]	5,500	2,400	6,100	11,700	5,700	[c]	61,000
1989	31,800 [d]	5,800	2,000	4,700	9,700	3,800	[c]	57,800
1990	28,860 [d]	6,600	2,300	4,900	9,900	8,000	700	61,260
1991	34,399 [d]	5,873	3,043	4,532	8,326	5,438	2,163	63,774
1992	31,702 [d]	4,317	2,184	5,971	11,325	3,708	2,635	61,842
1993	25,315 [d]	3,048	2,593	2,936	12,169	4,180	2,538	52,779
1994	30,145 [d]	3,491	2,289	4,343	8,056	4,513	2,322	55,159
1995	24,998 [d]	2,453	1,468	2,046	6,911	2,983	2,406	43,265
1996	27,161 [d]	3,883	1,733	2,866	8,892	3,319	2,113	49,967
1997	23,255 [d]	3,988	1,989	1,797	6,427	4,179	4,598	46,233
1998	24,072 [d]	4,069	1,112	3,555	5,419	3,166	4,958	46,351
1999	26,502 [d]	3,413	1,532	1,805	4,556	2,772	5,389	45,969
2000	27,931 [d]	3,173	1,111	3,946	3,715	2,792	2,362	45,029
2001	26,435 [d]	3,700	2,129	2,218	7,294	2,209	4,096	48,080
2002	25,004 [d]	3,254	1,517	2,735	6,043	3,098	3,247	44,897
2003	26,955 [d]	4,214	2,044	2,291	10,817	5,721	3,034	55,076
2004	23,308 [d]	2,052	2,206	1,891	6,714	3,619	3,364	43,154
20 Year Ave.	27,787	4,191	2,262	3,992	9,513	4,455	3,062	54,497
1985-94 Ave.	30,012	4,963	2,841	5,468	12,348	5,524	2,072	62,191
1995-04 Ave.	25,562	3,420	1,684	2,515	6,679	3,386	3,557	46,802
2005	21,898 [d]	1,576	1,795	1,388	9,673	8,422	3,088	47,841

[a] Harvests are extrapolated for all permits issued, based on those returned. Harvest estimates prior to 1991 are rounded to the nearest hundred fish.

[b] Harvest estimates prior to 1990 are based on the community where the permit was issued; estimates from 1990 to the present are based on community of residence and include fish caught only in the Nushagak District.

[c] No permits issued. Only residents of the Nushagak watershed could obtain subsistence permits.

[d] Includes permits issued in Clarks Point and Ekuk.

[e] Includes the village of Portage Creek and Clarks Point.

[f] Subsistence harvests by non-Nushagak watershed residents.

Appendix Table 4. Subsistence harvest of sockeye salmon by community, in numbers of fish, Kvichak River drainage, Bristol Bay, 1985-05. [a] [b]

Year	Levelock	Igiugig	Pedro Bay	Kokhanok	Iliamna-Newhalen[e]	Nondalton	Port Alsworth	Other [f]	Total
1985	6,600	3,400	12,900	21,900	22,300	14,900	4,500		86,500
1986	6,400	1,600	6,700	18,300	17,000	6,600	3,300		59,900
1987	5,700	[c]	7,300	16,500	27,500	11,800	3,200		72,000
1988	3,500	[c]	5,500	14,400	29,800	20,700	3,200	[d]	77,100
1989	5,100	1,200	6,700	13,000	24,700	18,500	2,200	[d]	71,400
1990	4,700	2,200	6,600	12,400	18,800	27,300	3,200	1,400	76,600
1991	1,029	1,712	9,739	17,184	29,094	4,163	2,755	1,110	66,786
1992	4,374	1,056	6,932	11,477	29,633	13,163	2,954	2,559	72,148
1993	4,699	1,397	6,226	18,810	19,067	17,890	3,254	2,780	74,123
1994	1,467	1,201	8,747	15,771	15,553	15,246	3,074	3,284	64,343
1995	3,756	497	5,359	14,412	20,134	4,188	2,892	3,441	54,679
1996	1,120	2,309	5,219	14,011	14,787	11,856	3,263	2,307	54,872
1997	1,062	2,067	5,501	8,722	19,513	17,194	2,348	3,101	59,508
1998	2,454	1,659	3,511	10,418	16,165	13,136	2,678	3,635	53,656
1999	1,276	1,608	5,005	10,725	14,129	17,864	4,282	2,834	57,723
2000	1,467	1,981	1,815	7,175	6,679	11,953	3,200	2,720	36,990
2001	908	779	2,118	9,447	8,132	7,566	1,958	1,901	32,808
2002	625	2,138	2,687	9,847	9,417	5,508	1,201	1,578	33,001
2003	737	1,081	2,135	9,771	13,824	8,016	1,370	1,591	38,495
2004	1,000	1,026	4,803	11,869	21,652	8,789	2,455	1,631	53,225
20 Year Ave.	2,899	1,606	5,775	13,307	18,894	12,817	2,864	2,391	59,793
1985-94 Ave.	4,357	1,721	7,734	15,974	23,345	15,026	3,164	2,227	72,090
1995-04 Ave.	1,441	1,515	3,815	10,640	14,443	10,607	2,565	2,474	47,496
2005	914	1,017	4,162	16,801	12,010	8,824	2,457	2,078	48,263

[a] Harvests are extrapolated for all permits issued, based on those returned. Harvest estimates from 1991 are rounded to the nearest hundred fish.

[b] Harvest estimates prior to 1990 are based on the community where the permit was issued; estimates from 1990 to the present are based on community of residence and include fish caught only in the Kvichak District.

[c] No permits issued.

[d] No permits issued. Only residents of the Naknek/Kvichak watershed could obtain subsistence permits.

[e] Includes Chekok

[f] Subsistence harvests by non-Kvichak River watershed residents.